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HUMMING BIRDS AMONG TROPICAL FLOWERS.

Selasphorus floresii. 1. Male 2. Female. 3. Euphrosa ecimia.

[illegible]

THE MODERN CYCLOPEDIA OF UNIVERSAL INFORMATION

A HANDY BOOK OF REFERENCE ON ALL SUBJECTS AND FOR ALL READERS

WITH NUMEROUS PICTORIAL ILLUSTRATIONS AND A SERIES OF MAPS

EDITED BY
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VOL. IV.

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LIST OF PLATES.

BESIDES

270 ILLUSTRATIONS IN THE TEXT.

KEY TO THE PRONUNCIATION.

The pronunciation of the words that form the titles of the articles is indicated in two ways: 1st, By *re-writing* the word in a different form and according to a simple system of transliteration. 2d, By marking the syllable on which the chief *accent* falls. Entries which simply have their accentuation marked are English or foreign words that present little difficulty, and in regard to which readers can hardly go far wrong. A great many of the entries, however, cannot be treated in this way, but must have their pronunciation represented by a uniform series of symbols, so that it shall be unmistakable. In doing this the same letter or combination of letters is made use of to represent the same *sound*, no matter by what letter or letters the sound may be represented in the word whose pronunciation is shown. The key to the pronunciation by this means is greatly simplified, the reader having only to remember one character for each sound. Sounds and letters, it may be remarked, are often very different things. In the English language there are over forty sounds, while in the English alphabet there are only twenty-six letters to represent them. Our alphabet is, therefore, very far from being adequate to the duties required of it, and still more inadequate to represent the various sounds of foreign languages.

The most typical *vowel* sounds (including diphthongs) are as shown in the following list, which gives also the characters that are used in the Cyclopedia to show their pronunciation, most of these being distinguished by diacritical marks.

ā, as in f*a*te, or in b*a*re.
ä, as in *a*lms, Fr. *â*me, Ger. B*a*hn=*á* of Indian names.
ȧ, the same sound short or medium, as in Fr. b*a*l, Ger. M*a*nn.
a, as in f*a*t.
a̤, as in f*a*ll.
a, obscure, as in rur*a*l, similar to *u* in b*u*t, ė in h*e*r: common in Indian names.
ē, as in m*e*=*i* in mach*i*ne.
e, as in m*e*t.
ė, as in h*e*r.
ī, as in p*i*ne, or as *ei* in Ger. m*ei*n.
i, as in p*i*n, also used for the short sound corresponding to ē, as in French and Italian words.
eu, a long sound as in Fr. j*eû*ne, =Ger. long *ö*, as in Söhne, Göthe (Goethe).
eu, corresponding sound short or medium, as in Fr. p*eu*=Ger. *ö* short.
ō, as in n*o*te, m*oa*n.
o, as in n*o*t, s*o*ft—that is, short or medium.
ö, as in m*o*ve, tw*o*.
ū, as in t*u*be.
u, as in t*u*b: similar to ė and also to *a*.
ṳ, as in b*u*ll.
ü, as in Sc. ab*u*ne=Fr. *û* as in d*û*, Ger. *ü* long as in gr*ü*n, B*ü*hne.
u̇, the corresponding short or medium sound, as in Fr. b*u*t, Ger. M*ü*ller.
oi, as in *oi*l.
ou, as in p*ou*nd; or as *au* in Ger. H*au*s.

Of the *consonants*, b, d, f, h, j, k, l, m, n, ng, p, sh, t, v, z, always have their common English sounds, when used to transliterate foreign words. The letter c is not used by itself in re-writing for pronunciation, s or k being respectively used instead. The only consonantal symbols, therefore, that require explanation are the following:—

ch is always as in ri*ch*.
d, nearly as *th* in *th*is=Sp. *d* in Ma*d*rid, &c.
g is always hard, as in *g*o.
h represents the guttural in Scotch lo*ch*, Ger. na*ch*, also other similar gutturals.
n̤, Fr. nasal *n* as in bo*n*.
r represents both English *r*, and *r* in foreign words, which is generally much more strongly trilled.
s, always as in *s*o.
th, as *th* in *th*in.
th, as *th* in *th*is.
w always consonantal, as in *w*e.
x=ks, which are used instead.
y always consonantal, as in *y*ea (Fr. *ligne* would be re-written lēny).
zh, as *s* in plea*s*ure=Fr. *j*.

THE MODERN CYCLOPEDIA.

VOL. IV.

Fire, the simultaneous and vividly perceptible evolution of heat and light during the process of combustion. The uses and dangers of fire, and to some extent the means of controlling it, have been generally understood from a very early period. The symbolic and superstitious uses of fire are numerous, and have been, or are, common to all races. Anciently fire was regarded as one of the four elements of which all things are composed, the other three being *air*, *earth*, and *water*. See *Combustion* and articles following this.

Fire-alarm, an apparatus, mechanical, electric, and telegraphic, used for detecting fires, and for giving instantaneous notice of an outbreak. Detectors are often placed in the different apartments of a building, which ring an alarm when the temperature reaches a certain height. In large towns a series of signal-boxes is distributed in different quarters from which an alarm can be immediately telegraphed to the fire-brigade station.

Fire-annihilator. See *Extincteur*.

Fire-arms, a general name for all sorts of guns, rifles, fowling-pieces, blunderbusses, pistols, &c., which effect their discharge by the combustion of gunpowder.

Fire-ball: (1) a ball filled with powder or other combustibles, intended to be thrown among enemies, and to injure by explosion, or to set fire to their works. (2) a popular name applied to a certain class of meteors which exhibit themselves as globular masses of light moving with great velocity, and not unfrequently passing unbroken across the sky until lost in the horizon. They differ from ordinary meteors, probably, more in volume and brilliancy than in any other distinctive characteristic. They are not to be confounded with another class of meteors that explode in their passage, and appear to let fall a dull red body (meteorolite) to the earth.

Fire-bote, in old law, an allowance of fuel to which a tenant was entitled, from the estate on which he resided.

Fire-box, the box (generally made of copper) in which the fire in a locomotive engine is placed. See *Boiler*.

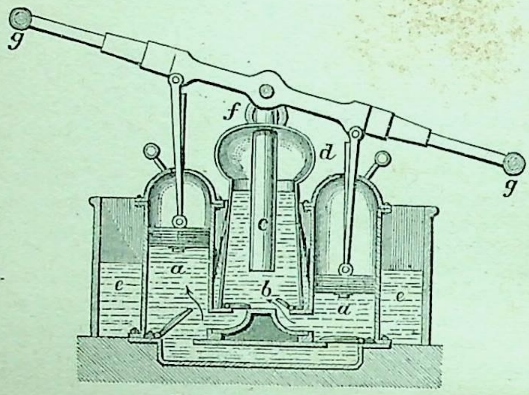
Fire-brigades are bodies of firemen organized in large towns to work the fire-engines and other means of saving property from fire. They are under the control of the municipal authorities, and are mainly supported by the rates, the London fire-brigade having, in addition, a grant from government.

Fire-clay, a compact kind of clay, consisting chiefly of silica and alumina, capable of sustaining intense heat, and used in making fire-bricks, gas-retorts, crucibles, &c. The most highly esteemed fire-clay is that of Stourbridge, which is used wherever high temperatures have to be resisted. Fire-clay belongs to the coal formation, and always forms a stratum immediately below each seam of coal.

Fire-damp, light carburetted hydrogen gas or marsh-gas (CH_4). It is sometimes very abundantly evolved in coal-mines, and is productive of the most dreadful results when it explodes, occasioning the death of nearly all then at work in the mine. It appears to be generated by the decomposition of partially carbonized coal, and when it constitutes more than $\frac{1}{13}$th of the volume of the atmosphere of mines the whole becomes highly explosive when fire is brought in contact with it. The safety-lamp affords the chief protection against the fatal effects of this gas.

Fire-engine, an engine for throwing water to extinguish fire and save buildings. Fire-engines are a species of force-pumps, in which the water is subjected to pressure sufficient to raise it to the required height. Those commonly used consist of two force-

pumps, which play into a common reservoir containing in its upper portion (the air-chamber) air compressed by the working of the engine. A tube dips into the water in the reservoir, and to the upper end of this tube is screwed the leather hose through which the water is discharged. The piston-rods are jointed to a double lever, the ends of which are connected with two long handles running parallel to the engine on each side, so that the lever may be worked by several men at once. The ends of the lever are thus raised and depressed alternately, and one piston ascends while the other descends, water being thus continually forced into the reservoir, except at the instant of the reversing stroke; and as the compressed air in the air-chamber performs the part of a reservoir of work the discharge of water from the hose is very steady. The engine is usually furnished with a suction-pipe which is attached to a water-main or the like, and is thus self-feeding. Steam fire-engines now in common use consist essentially of a pair of single-acting suction and force pumps driven by steam-power. The boilers are tubular, of sufficient capacity to work the pumps 500 strokes per minute. Steam fire-engines will throw a jet of water from a nozzle $1\frac{1}{2}$ inch in diameter to a height of 130 feet, the volume of water ejected being about 400 gallons per minute.



Section of Fire-engine.

a, Forcing pumps. *b*, Common reservoir. *c*, Tube attached to hose. *d*, Compressed-air chamber. *e*, Cisterns. *f*, Hose attachment. *g*, Levers.

Fire-escape, a contrivance for enabling persons to escape from the upper part of a building when on fire. It is composed of an arrangement of long ladders, capable of being drawn out after the manner of a telescope, and mounted on wheels for easier transport from place to place. Under the whole length of the lower or main ladder is a kind of trough made of stout sail-cloth, protected by an outer trough of copper wire net. This trough is used for lowering people from a burning house who are unable from fear or other causes to descend the ladder.

Firefly, a name indefinitely given to any winged insect which possesses much luminosity. Except the lantern-fly, the fireflies are all coleopterous, and are members of two nearly allied families, the Elateridæ or skip-jacks, and Lampyridæ, to which the glow-worm belongs. The British glow-worm has too little luminosity to entitle it to the name of firefly, but the *Lampўris italica*, and *L. corusca* of Canada are allied to it. True fireflies are found only in the warmer regions of the earth. The *Elăter* or *Pyrophŏrus noctilŭcus* of South America and the West Indies is one of the most brilliant, giving out its light from two eye-like tubercles on the thorax. Their light is so powerful that small print may be read by it, and in Hayti they are used to give light for domestic purposes, eight or ten confined in a phial emitting sufficient light to enable a person to write.

Fire Insurance, insurance against loss by fire. See *Insurance*.

Firelock, a musket or other gun, with a lock furnished with a flint and steel, by means of which fire is produced in order to discharge it; distinguished from the old matchlock, which was fired with a match.

Fire of London, The Great, broke out in a house near London Bridge 2d Sept. 1666, and raged for several days. Two-thirds of London was destroyed—eighty-nine churches and more than 13,000 dwelling-houses. The monument erected by Wren at Fish Street Hill commemorates the great fire, and at one time bore an inscription attributing the fire to the Popish faction.

Fire Ordeal. See *Ordeal*.

Fire-proofing. Various plans have been adopted for rendering houses, or an apartment in a house, fireproof, as by constructing them entirely of brick or stone, and employing iron doors, ties, and lintels, stone staircases and landings. In the case of textile fabrics, as cotton, linen, &c., saturation with various salts, as borax, which leave their crystals in the substance of the fabrics,

is the means adopted for rendering them incombustible. Wood is best protected by silicate of soda, which, on the application of strong heat, fuses into a glass, and this, enveloping not only the outside but also the internal fibres of the wood, shields it from contact with the oxygen of the air. Fire-proof safes are generally constructed with double walls of stout iron, having a space between the walls filled with some substance which is a very bad conductor of heat.

Fire-raising, in Scotch law, is the same as arson in English law. In Scotland it is a capital crime in some cases, but capital punishment is not now inflicted. See *Arson.*

Fire-ships are generally old vessels filled with combustibles, and fitted with grappling-irons, to hook enemies' ships and set them on fire. This ancient device has been frequently tried in modern warfare, though it can never be of much effect when employed against modern ships.

Fire-works, preparations in various shapes of gunpowder, charcoal, sulphur, saltpetre, filings of iron, &c., used for display at times of public rejoicing, &c. They may be divided into simple hand-pieces, such as squibs, crackers, rockets, Roman candles, &c., and arranged 'pieces,' which are contrived with much skill and ingenuity to represent, when ignited, various devices and pictures.

Fire-worship, the worship of fire, the highest type of which worship is seen in the adoration of the sun, not only as the most glorious visible object in the universe, but also as the source of light and heat. In the early religion of India the sun appears in the form of the god Agni (a name akin to Lat. *ignis*, fire), what was first regarded as a mere abstract influence or a phenomenon, in time being regarded as a sentient individual. Thus in the Vedic hymns Agni is the god of fire, corresponding to the Greek Hephæstos (Vulcan). In the East the worship of the element of fire was practised by the ancient Persians or Magians, and is continued by the modern Parsees. The establishment of this species of idolatry among the Persians is ascribed to Zoroaster, who taught his disciples that in the sun and in the sacred fires of their temples God more especially dwelt, and that therefore divine homage was to be paid to these.

Firishta. See *Ferishta.*

Firkin, a British measure of capacity, being the fourth part of a barrel, or equal to $7\frac{1}{2}$ imperial gallons, or 2538 cubic inches. It is now legally abolished.

Fir'lot, a dry measure used in Scotland, but now legally abolished; the fourth part of a boll.

Firm, a partnership or association of two or more persons for carrying on a business; a commercial house; or the name or title under which a company transact business.—*Long Firm*, a term given to that class of swindlers who obtain goods by pretending to be in business in a certain place, and ordering goods to be sent to them, generally from persons at a distance, without any intention of payment. When they have obtained all they can in this way they decamp, to reappear elsewhere under a different name. A person practising this system is said to be a member of the Long Firm.

Fir'mament, the vault of heaven. The Hebrew word *rakia*, which is so rendered in Scripture, conveys chiefly the idea of expansion, although that of solidity is also suggested, inasmuch as the root signification of the word is that which is expanded by beating out. The English *firmament* is adopted from the Latin *firmamentum*, which is the equivalent of the Greek *stereōma* (*stereos*, firm, solid), by which the writers of the Septuagint rendered *rakia*.

Fir'man (Per. *fermân*), a decree, order, or grant of an Oriental sovereign, as of Turkey, issued for various special purposes, for instance to ensure a traveller protection and assistance. It differs from a *Hatti Sherif* in so far as it may be signed by any minister, whereas the Hatti Sherif is approved by the Sultan himself with his special mark, and is therefore supposed to be irrevocable.

Firn, the more or less compacted mass of snow which furnishes the material from which glaciers are formed, called also *névé*.

Firol'idæ, a family of gasteropodous molluscs, belonging to the order Nucleobranchiata or Heteropoda. The members of the typical genus *Firola* are very common in tropical seas and in the Mediterranean, but are so transparent that sometimes they can scarcely be seen. They swim with their foot upwards. They have no shell. The individuals of *Carinaria*, another genus, have a small delicate shell inclosing the gills.

Firozábád, town and municipality in Agra district, North-western Provinces of India, head-quarters of a tahsil of the same name, 24 miles E. of Agra. It contains numerous ruins of handsome buildings; is a station on the E. Indian Railway, 817 miles from Calcutta. Pop. 16,023. Pop. of tahsil or revenue district, 108,521.

Firozpur', a thriving commercial town, Punjab, India, capital of a district of the same name. The arsenal is the largest in the Punjab. Pop., including the military cantonments, 2 miles s. of the city, 50,437. The district forms the south-western portion of the Jalandhar division. Area, 4302 sq. m.; pop. 886,676.—Firozpur is also the name of a town in Gurgaon district, Punjab. Pop. 6878.

Firozshah', a battle-field in Firozpur district, Punjab; the scene of the defeat of the strongly-intrenched Sikh army by the British forces under Sir Hugh Gough and Sir Henry Hardinge, 21st Dec. 1845.

First-fruits, in the Church of England, the income of every spiritual benefice for the first year, paid originally to the crown, but now to a board, which applies the money so obtained to the supplementing of the incomes of small benefices. See *Annates*.

Firth, FRITH, an estuary, a term applied in Scotland to arms of the sea, such as the Firth of Clyde, of Tay, and of Forth, &c. It is the same word as the Norwegian *fjord*.

Fischart (fish'ärt), JOHANN, German satirist, born between 1545 and 1550, died in 1589. His writings are mostly satirical, partly in prose, partly in verse, partly of both mixed together, and have the most whimsical titles. As a satirist he is the most unrestrained of his age, the papal dignity, and the lives of the priesthood and Jesuits, astrological superstition, scholastic pedantry, &c., being among his favourite subjects of attack. His most celebrated works are a rifaccimento of the Gargantua of Rabelais, Das glückhafft Schiff von Zürich (The Lucky Ship of Zurich), and about fifty others.

Fish. See *Ichthyology*.

Fish Culture. See *Pisciculture*.

Fisher, JOHN, Bishop of Rochester, was born in 1459, at Beverley, in Yorkshire, and graduated M.A. at Cambridge in 1491. In 1501 he received the degree of D.D., and was made chancellor of the university. In 1504 he was promoted to the see of Rochester. He opposed Henry VIII.'s divorce; listened to the pretended prophecies of Elizabeth Barton, the Maid of Kent; opposed the royal supremacy, and was imprisoned in 1534 and attainted. His appointment as cardinal by Paul III. led to his execution after trial by a special commission, 1535.

Fisheries, a term which includes all the industries concerned in the capture of the inhabitants of fresh and salt water for food and other economic purposes. It is thus applied to the procuring not only of fish proper, but also of other animals and products found in the sea, such as sponges, corals, pearls, shell-fish, turtles, whales, seals, &c. The most important of fresh-water fisheries is that of salmon, which is prosecuted with draw-nets, stake-nets, and by sportsmen with fly-hooks. Trout, eel, pike, and perch are among the other important fresh-water fishes. Sea-fisheries, including the herring, cod, haddock, and other fishes, are prosecuted in a variety of ways. Hand-line and long-line fishing are worked more or less all round the British coasts. Of nets the chief varieties are trawls, drift-nets, seines, bag-nets, and trammel or set nets. Fisheries have generally been considered so important an object of national wealth that government have been careful to protect and encourage them in various ways. The right to various fisheries has often been a matter of international disputes, negotiations, and treaties. (See *Canada*.) Fisheries belonging to particular governments, especially inland fisheries in lakes and rivers, are also frequently protected by laws relating to the mode of capture, &c., which vary with the particular circumstances. The countries whose fishing industries produce the most valuable returns are Great Britain, British North America, and the U. States. The total value of the British sea-fisheries at present reaches about £6,000,000 per annum, the chief yield being from herring, haddock, and cod. The Canadian fisheries with those of Newfoundland are probably nearly as great; those of the U. States are said to be greater in value. The banks of Newfoundland are one of the richest fishing grounds in the world, and are largely frequented by French fishermen. The German Ocean also yields a very rich harvest to the fishermen of all the surrounding coasts, especially in herring, cod, haddock, flat-fish, &c. A large number of steam-trawling vessels now ply their vocation on the British coasts, and numerous steam-carrying vessels are also employed to convey the fish to shore after they have been caught by the fishing-smacks that themselves keep the sea for weeks on end.

Fishes. See *Ichthyology*.

Fish-glue, a coarse species of isinglass.

Fish-hawk, a name given in America to the osprey or fishing-eagle (*Pandion haliaëtus*). See *Osprey*.

Fish-hook, a curved, barbed, and pointed steel wire used for catching fish. Redditch in Worcestershire and Limerick are the chief British seats of the fish-hook manufacture. The Limerick hook, which has the greatest reputation, has a barb that is forged solid, and then filed into the proper shape, while ordinary hooks have a barb that is raised by cutting into the wire. Hook-making machines are now common, especially in the U. States, where the wire is run into the machine, and on the other side the hook drops out completed, with the exception that it must be tempered and coloured.

Fishing. See *Fisheries* and *Angling.*

Fishing-frog. See *Angler.*

Fishing-rod, a long slender rod, usually made in jointed sections, to which the line is fastened in angling. See *Angling.*

Fish-joint, a splice or joining, as in railways, where two rails end to end are fastened together by flat pieces of iron (*fish-plates*) placed on each side of the rails, and fastened by screw-nuts and bolts (*fish-bolts*).

Fish-louse, a name for several crustaceans of the order Ichthyophthira, parasitic on fishes. Some are common on many of the British sea-fishes. *Argŭlus foliaceus* is found on fresh-water fishes, and even on tadpoles. Sickly fishes often become the victims of multitudes of these creatures, or the sickness is induced by the numbers which attack them.

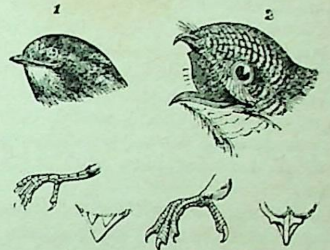
Fission, in physiol., reproduction by division of one animal of low type into two, each of these, again, dividing into two others, and so on. The products of the division of the body of the primitive organism may either remain undetached, when they will give rise to a composite structure (as in many corals), or they may be thrown off and live an independent existence (as in some of the Hydrozoa).

Fissirostres (-ros'trēz), a tribe of the Insessores or perching birds, distinguished by having a very wide gape, extending beneath the eyes. It comprehends the night-jars or goatsuckers, whip-poor-will, swallows, swifts, martins, &c. But in modern classification this division is often disregarded.

Fissurel'lidæ, the keyhole limpets, a family of gasteropodous molluscs resembling the limpets in appearance and habits, but differing considerably in structure. The animal is generally too large for the shell, so that in the typical genus *Fissurella* the shell appears as if it were rudimentary. The species are widely distributed; many are British, and many fossil.

Fis'tula, in surg. a channel open at both ends excavated between an internal part and the skin-surface, showing no tendency to heal, and generally arising from abscesses. It occurs most frequently at some outlet of the body, as the urinary passages and anus.

Fistula'ria, a genus of acanthopterygious fishes characterized by the elongation of the



Fissirostres.

1, Diurna. Head, foot, and bill of a swallow, 2, Nocturna. Head, foot, and bill of a goatsucker.

facial bones into a long fistula or tube at the extremity of which the mouth opens. A notable species is the tobacco-pipe fish.

Fistuli'na, a genus of Fungi, allied to *Boletus*, found on old oak, walnut, and chestnut trees, as also on ash and beech; it is much esteemed in some parts of Europe as an article of food. When grilled it is scarcely to be distinguished from broiled meat.

Fit, a sudden and violent attack of disorder, in which the body is often convulsed, and sometimes the person is unconscious; as, a *fit* of apoplexy or epilepsy.

Fitch. See *Fitchet.*

Fitchburg, an American city, Worcester county, Mass., 40 miles N.W. of Boston; has manufactures of paper, machinery, woollen goods, &c. Pop. (1890), 22,037.

Fitchet, or FITCH, the fur of the polecat. It has a yellow ground, with long, soft, black shining hairs on its surface, which are exclusively used for artists' brushes. The fur is not in great request as it emits an unpleasant odour which is difficult to dissipate. See *Polecat.*

Fitz, the old French word for *fils*, son; used as a prefix in certain surnames, as *Fitz*gerald, *Fitz*herbert, *Fitz*maurice, *Fitz*william, especially in the surnames of the illegitimate sons of kings or princes of the blood, &c.; as, *Fitz*roy, *Fitz*clarence.

Fitzgerald (fits-jer'ald), FAMILY OF, an Irish family descended from William, Castellan of Windsor in the Conqueror's reign. Two branches of this house, the Earls of Desmond and Kildare, were for long the practical rulers of the English part of Ireland. The Kildare branch is still represented by the ducal house of Leinster.

Fitzgerald, LORD EDWARD, born near Dublin 1763, died 1798. He was a younger son of the Duke of Leinster, and married Pamela, the reputed daughter of the Duke of Orleans (Égalité) and Mdme. de Genlis. In 1796 he joined the United Irishmen, and plotted for a French invasion of Ireland; was betrayed by a spy, and arrested. He stabbed two of the officers sent to take him, but was disabled by a pistol-shot, which caused his death before he could be brought to trial.

Fitzgerald, LORD THOMAS, known as 'silken Thomas,' born about 1513, died 1536. He was vice-deputy for his father, the ninth earl of Kildare, on whose arrest by Henry VIII. Lord Thomas raised a formidable revolt in Ireland, which was ultimately put down by Skeffington, and Lord Thomas and his five uncles were hanged at Tyburn.

Fitzroy', ROBERT, English admiral and meteorologist, born 1805, died by his own hand 1865. He entered the navy in 1819, and from 1828 to 1836 was employed in hydrographical surveys, and in forming a chain of meridional distances round the globe. On his return he published Narrative of the Surveying Voyages of the Adventure and Beagle. In 1854 he became superintendent of the meteorological department of the Board of Trade. In 1857 he was promoted to the rank of rear-admiral, and in 1863 to that of vice-admiral. He acquired great popularity with the public for the system of storm-warnings which he established.

Fiume (fi-ö'me), a seaport town of Austro-Hungary, and a free town of the Hungarian kingdom, picturesquely situated on the Gulf of Quarnero, in the N.E. extremity of the Adriatic. It has some good streets and buildings (including a cathedral), and its industries embrace paper, tobacco, machinery, chemicals, petroleum, metal goods, liqueurs, &c. Large sums have recently been spent by the Hungarian government on the improvement of its harbour accommodation, and it is now a place of large trade. Pop. 29,494.

Five Forks, a locality in Dinwiddie county, Virginia; the scene of an important battle fought 1st April, 1865, one week before the close of the civil war. After heavy fighting the Confederates were completely defeated.

Five Mile Act, an act of Charles II. (1665) forbidding nonconformist clergymen who refused to take the oath of non-resistance, and swear to attempt no alteration of the constitution in church or state, to come within five miles of any corporate town where they had preached since the Act of Oblivion. They were also prevented from keeping schools. The act was repealed in 1688.

Fives, a kind of game with a ball, originally called hand-tennis, played on a level piece of ground with a smooth wall, against which the ball is struck after its first rebound from the ground: so named probably from its being usually played with five on each side, although others give different explanations, as that it is so called because the ball is struck with the hand or *five* fingers.

Fixed Air, the old name for carbonic acid.

Fixed Alkalies, potash, soda, lithia, and oxides of the rare metals rubidium and cæsium, so named in contradistinction to ammonia, which is termed volatile alkali.

Fixed Oils. See *Oils.*

Fixed Stars, those stars which appear to remain always at the same distance from each other and in the same relative position. The name comprehends, therefore, all the heavenly bodies, with the exception of the planets, with their moons, and the comets. See *Stars.*

Fixtures, in law, are accessories annexed to houses or lands, which by the fact of their being so annexed become a part of the real property and pass to the freeholder, not being removable at will by the tenant or occupier of the property. The general rule of law is that whatever has been affixed to the premises or put into the land by a tenant during his occupancy cannot be removed without the landlord's consent. Large exceptions are made to this rule in favour of the tenant, covering generally fixtures for trade, for agricultural purposes, and for ornament or convenience; but the removal must not injure the land or buildings of the landlord.

Flag, a piece of cloth on which certain figures or devices are painted, impressed, or wrought, borne on a staff or pole, and usually employed to distinguish one company, party, or nationality from another. In the

army a flag is a banner by which one regiment is distinguished from another. Flags borne on the masts of vessels not only designate the country to which they belong, but also are made to denote the quality of the officer by whom a ship is commanded. Thus in the British navy an admiral's flag is displayed at the maintop-gallant-mast-head, a vice-admiral's at the foretop-gallant-mast-head, and a rear-admiral's at the mizzen-top-gallant-mast-head. In the navy the supreme flag of Great Britain is the royal standard, which is only to be hoisted when the sovereign or one of the royal family is on board the vessel. All British ships of war in commission carry the white ensign, that is a white flag divided into four quarters by the red cross of St. George and having the union flag (or union 'jack' as it is popularly called) in the upper corner next the staff. British merchant ships are entitled to carry a red flag with the union in the corner. The union is the flag commonly used on shore as the national ensign. To lower or *strike* the flag is to pull it down, or take it in, out of respect or submission to superiors. To lower or strike the flag in an engagement is a sign of yielding. A sign of mourning is to hoist the flags at a half or two-thirds of the height of the masts, if on land at half the height of the staff. Besides the use of flags as distinguishing emblems, a very important use of them at sea, both by national and mercantile navies, is as signals according to an arranged code.

Flag, a popular name for many endogenous plants with sword-shaped leaves, mostly growing in moist situations; but sometimes particularly appropriated to *Iris Pseudacŏrus,* nat. order Iridaceæ; also termed *Flower de lis* or *Flower de luce.* It has sword-shaped leaves and yellow flowers, grows in marshy places and by the sides of streams and lakes. The stout creeping root-stock has been recommended for alleviating the toothache, and is used for dyeing black in the Hebrides. The leaves make excellent thatch, and are also employed for making bottoms to chairs.

Flagellants (flaj'el-ants; Latin *flagellare,* to lash or scourge), the name of a sect in the 13th century who maintained that flagellation was of equal virtue with baptism and other sacraments. They walked in procession with shoulders bare, and whipped themselves till the blood ran down their bodies, to obtain the mercy of God and appease his wrath against the vices of the age. Rainer, a hermit of Perugia, is said to have been its founder in 1260. He soon found followers in nearly all parts of Italy. Their number soon amounted to 10,000, who went about, led by priests bearing banners and crosses. They went in thousands from country to country, begging alms; and for centuries they formed a sort of intermittent order of fanatics, frequently reappearing here and there in times of extraordinary declension or distress.

Flageolet (flaj'o-let), a small wind-instrument of music, played by means of a mouthpiece. The tone produced is similar to that of the piccolo, but is softer in quality, and the range is two octaves. The double flageolet consists of two instruments united by one mouthpiece, and producing double notes. The name *flageolet tones* is given to those harmonic tones on the violin, violoncello, and other stringed instruments, produced by the finger lightly touching the string on the exact part which generates the harmony, and not by pressing the string down to the finger-board.

Flag-officer, in the British navy, a general distinguishing title for an admiral, vice-admiral, and rear-admiral, who have the right to carry flags indicating their rank at the mast-head.

Flag of the Prophet, the *Sanjak-sherif,* or sacred flag of the Mohammedans. It was originally composed of the turban of the Koreish captured by Mohammed; but the black curtain that hung in front of the door of Ayesha, one of Mohammed's wives, was afterwards substituted. It is preserved in the seraglio at Constantinople. The carefully-guarded banner unfolded at the commencement of a war is not the real sacred flag, though it is commonly believed to be so.

Flag-ship, a ship in which an admiral, or the commander of a squadron, hoists his flag.

Flagstone, any sandstone, limestone, &c., that is cut or split readily into thin layers, and may be used for pavements, floors, &c.

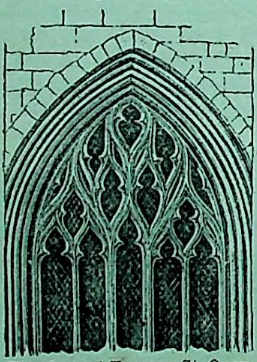
Flahaut de la Billarderie (flä-ō dė lȧ bē-yär-drē), AUGUSTE CHARLES JOSEPH, COMTE DE, French general and diplomatist, born 1785, died 1870. He had a brilliant career under Napoleon I., but on the return of the Bourbons he left France and lived in exile from 1815 to 1830. He married in England the daughter of Admiral Keith, who became Baroness Keith in 1823. He returned to France in 1830, and was ambassador successively at Berlin, Vienna, and London.

Flambard, Rannulph or Ralph, a Norman of humble origin who became the chief minister of William Rufus. He was early connected with the Conqueror's court, and being handsome, clever, and unscrupulous, he gained great influence with the king, and rose to still greater favour with Rufus, whom he encouraged in his tyrannical and rapacious courses. His flagrant extortions earned the hatred of the people, and his character is painted in the blackest characters by the chroniclers. In 1099 he was made Bishop of Durham; but on the death of William he was committed to the Tower by Henry I. He managed to escape, however, by a rope conveyed to him in a vessel of wine, and instigated Robert, duke of Normandy, to invade England. He was subsequently forgiven by Henry and restored to Durham, where latterly he lived peaceably, much engaged in architectural works connected with the city and the cathedral, till his death in 1128.

Flambeau, a sort of torch or light made of some sort of thick wick covered with wax or other inflammable material, and used at night in illuminations, processions, &c.

Flamborough Head, a headland on the east coast of England in Yorkshire. It consists of a lofty range of chalk cliffs about 6 miles long and from 300 to 450 feet high. On the extreme point of the promontory, at a height of 214 feet above sea-level, is a lighthouse 87 feet high, with a revolving light visible from a distance of 20 miles.

Flamboy′ant, a term designating a style of Gothic architecture in use in France about the same period with the Perpendicular style in England, that is, from the 14th to the 16th century, having prevailed during the whole of the 15th century. It was distinguished by the waving and somewhat flame-like tracery of the windows, panels, &c. (hence the name), and is usually regarded as a decadent variety of the decorated Gothic. The mouldings in this style are often ill combined, some of the members being disproportionately large or small. The pillars are often cylindrical, either plain or with a few of the more prominent mouldings of the arches continued down them, without any capital or impost intervening. This is so common that it may be regarded as a characteristic of the style. Mouldings also sometimes meet and interpenetrate each other. The arches are usually two-centred, sometimes semicircular, and, in later examples, elliptical. The foliage enrichments are usually well carved, but the effect is often lost from the minuteness and intricacy of the parts.


Flamboyant Tracery, St. Ouen, Rouen.

Flame, a blaze rising from a burning body, or any inflammable gas in a state of visible combustion. Flame is attended with great heat, and sometimes with the evolution of much light; but the temperature may be intense when the light is feeble, as is the case with the flame of burning hydrogen gas. The flame of a candle may be divided into three zones: an inner zone containing chiefly unburned gas, another zone containing partially-burned gas, and an outer zone where the gas is completely consumed by combination with the oxygen of the air. The luminosity of flame depends upon the presence of extremely small particles of solid matter (usually carbon) or of dense gaseous products of combustion. When the pressure of the gas producing the flame is so great that it is all but flaring, it is found that certain sounds will cause the flame to alter its shape, thus producing the phenomenon of *sensitive flames.*

Fla′men, among the ancient Romans the name given to any priest devoted to the service of one particular deity. Originally there were three priests so called: the *Flamen Diālis*, consecrated to Jupiter; *Flamen Martiālis*, sacred to Mars; and *Flamen Quirinālis*, who superintended the rights of Quirinus or Romulus; but the number was ultimately increased to fifteen, the original three, however, retaining priority in point of rank, being styled *Majōres*, and elected from among the patricians, while the other twelve, called *Minōres*, were elected from the plebeians.

Flamin′go, a bird of the genus *Phœnicoptĕrus*, formerly placed in the order of wading birds, but now generally ranked among the Natatores or swimmers, and constituting a family Phœnicopteridæ, allied to the Anatidæ or ducks. Its body is rather smaller than that of the stork, but owing to the great length of the neck and legs it stands from 5 to 6 feet high. The beak is



FLAMINGO AND NESTS.

naked, lamellate at the edges, and bent as if broken; the feet are palmated and four-toed. The common flamingo (*P. antiquorum*) occurs abundantly in various parts of Southern Europe, Northern Africa, &c. It is entirely scarlet, except the quill-feathers, which are jet-black. The tongue is fleshy, and one of the extravagances of the Romans during the later period of the empire was to have dishes composed solely of flamingoes' tongues. The flamingoes live and migrate in large flocks, frequenting desert sea-coasts and salt-marshes. They are extremely shy and watchful. While feeding they keep together, drawn up artificially in lines, which at a distance resemble those of an army; and, like many other gregarious birds, they employ some to act as sentinels, for the security of the rest. Their food appears to be mollusca, spawn, crustaceans, &c., which they fish up by means of their long neck, turning their head in such a manner as to take advantage of the crook in their beak. They breed in companies in inundated marshes, raising the nest to a certain height by heaping up the mud with their feet into a small hillock, which is concave at the top. In this the female lays her eggs, and it was formerly believed that she sat on them with her legs hanging down, like those of a man on horseback. But the nests are not so high as to allow of this, and the birds really sit with their legs doubled up under them. An American species of flamingo is *P. ruber*.

Flaminian Way, the principal northern road which led from ancient Rome. It was constructed by C. Flaminius the elder in 220 B.C. during his censorship, and led from Rome to Ariminum (Rimini) on the Adriatic, 222 miles. Remains of it are yet extant in various places.

Flamini'nus, Titus Quintius, Roman general, born about 230 B.C., died about 174. He was quæstor in 199, consul in 198, terminated the Macedonian war by the defeat of Philip at Cynoscephalæ 197, and proclaimed at the Isthmian games in 196 the independence of Greece.

Flamin'ius, Caius, Roman general, was tribune in 232 B.C., prætor in 227, consul in 223, censor in 220, and again consul in 217. He had a triumph for defeating the Insubrian Gauls; and during his second consulship he constructed the Flaminian Way and built a circus. In 217 he was sent against Hannibal into Etruria, and was defeated and killed in the battle of Lake Thrasymenus (23d June).

Flamsteed, John, the first astronomer-royal of England, was born 1646, died 1719. He graduated at Cambridge in 1674, took orders in the church, but devoted himself chiefly to mathematical and astronomical pursuits. He was appointed by Charles II. astronomical observator to the king, and carried on his observations at the Queen's House at Greenwich, until the observatory was built for him in 1676. Here he passed his life; formed the first trustworthy catalogue of fixed stars; and supplied the lunar observations by means of which Newton verified his lunar theory. His great work, Historia Cœlestis, was finished in 1723. In 1832 the discovery of a collection of his letters disclosed a protracted quarrel between him and Newton.

Flanders, a region of Europe, now included in Holland, Belgium, and France, stretching along the German Ocean. The erection of the territory into a county took place in the 9th century, and was made by Philip the Bold, king of France, in favour of his son-in-law, Baldwin. It afterwards passed to the united houses of Spain and Austria, and ultimately to the latter, but underwent considerable curtailment by the conquests of the French in the west, when part of it became French Flanders, and by the conquests of the Dutch in the north. The remainder still retains its ancient name, and forms the modern provinces of East and West Flanders, in Belgium.—The Belgian province of East Flanders (French, *Flandre Orientale*) has an area of 1157 square miles. The surface forms an extensive plain, sloping gently eastwards. It wholly belongs to the basin of the Schelde. Its soil, partly of a sandy and partly of a clayey nature, is so industriously and skilfully cultivated that it has the appearance of a vast garden. The principal crops are wheat and flax. Linen, laces, and damask are among the important manufactures. Gand or Ghent is the capital. Pop. 939,748.—West Flanders (French, *Flandre Occidentale*) has an area of 1248 square miles. The surface is generally flat; the soil naturally sandy and poor, but well cultivated and fertilized, though not so productive as that of East Flanders. The most important branch of industry is linen. Great quantities of lace also are made. Bruges is the capital. Pop. 732,317.

Flange, a projecting edge, rim, or rib on any object, as the rims by which cast-iron pipes are connected together, or the projecting pieces on the tires of the wheels of

railway-carriages to keep them on the rails.

Flank, in fortification, that part of a work which affords a lateral defence to another. In military tactics flank signifies the outer extremity of the wing of an army, or of any division of an army, as of a brigade, regiment, or battalion.

Flannel, a woollen fabric of loose texture and various degrees of fineness, much used as a clothing both in hot and cold countries from its properties of promoting insensible perspiration, which is absorbed and carried off by the atmosphere. Welsh flannels have attained a high reputation. In flannel shirtings the wool is frequently mixed with silk, linen, and cotton.

Flat, a character or sign in music, used to lower or depress, by the degree of a semitone, any note in the natural scale. It is marked thus ♭. An *accidental flat* is one which does not occur in the signature, and which affects only the bar in which it is placed.

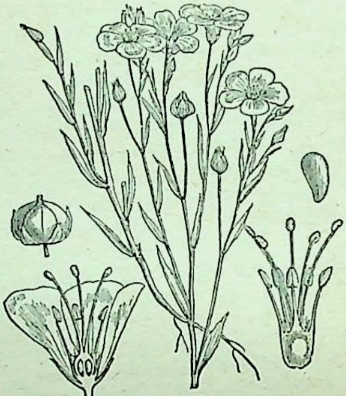
Flat-fish, a fish which has its body of a flattened form, swims on the side, and has both eyes on one side, as the flounder, turbot, halibut, and sole. The sense is sometimes extended to other fishes which have the body much compressed, as the skate and other members of the ray family.

Flathead Indians, tribes established on the Pacific coast, mainly of the now nearly extinct Chinook group of fish-eating Indians. They flatten the skull of the infant by pressure. The same custom anciently prevailed among many tribes, but the practice is now nearly extinct. The name Flathead is improperly given to the small civilized tribe of Selish Indians, who do not flatten the heads of their children.

Fla'vel, John, nonconformist divine, born in Worcestershire 1627, died at Exeter 1691. He was curate at Deptford and Dartmouth, but was ejected under the Act of Uniformity, when he continued to preach privately. After the fall of the Stuarts he returned to Dartmouth. His works were long immensely popular.

Flavine (Lat. *flavus*, yellow), a yellow dye-stuff identical with quercitrin, and used as a substitute for quercitron bark. It gives a fine olive-yellow colour to cloth.

Flax, the common name of the plants of the genus *Linum*, nat. order Linaceæ. The species, of which there are nearly a hundred, are herbs or small shrubs, with narrow leaves, and yellow, blue, or even white flowers arranged in variously-formed cymes. They occur in warm and temperate regions over the world. The cultivated species is *L. usitatissimum*. The fibre which is used for making thread, and cloth called linen, cambric, lawn, lace, &c., consists of the woody bundles of the slender stalks. The fine fibres may be so separated as to be spun into threads as fine as silk. A most useful oil is expressed from the seeds, and the residue, called linseed-cake, is one of the most fattening kinds of food for cattle. When the plant is ripe it is pulled up by the roots,



Flax (*Linum usitatissimum*).

tied together in little bundles, and usually left upright on the field till it becomes dry, when the seeds are separated, either by beating on a cloth or by passing the stems through an iron comb. The process of removing the seeds is called *rippling*. The stalks are then *retted* or rotted in water to free the flaxen fibre from the woody core or *boon* of the stem. Two operations are necessary to separate the fibres from the woody part of the stem. The flax is first *broken* by means of a wooden handle and grooved board, or by revolving grooved rollers, and then the *boon* or woody part is entirely separated from the fibre by a broad flat wooden blade called a *scutching blade*, or by a machine in which a number of knives attached to the arms of a vertical wheel strike the flax in the direction of its length, and completely separate it. The flax is next *heckled*, or combed with a sort of iron comb, beginning with the coarser and ending with the finer, and is now ready for spinning. See *Linen*.

Flax, New Zealand, a fibre obtained from a plant belonging to the order Lilia-

ceæ, the *Phormium tenax.* It is indigenous in New Zealand and Norfolk Island, and grows in great tufts with sword-shaped leaves sometimes 6 feet long. The long spike, bearing a large number of yellow flowers, rises from the centre of the leaves. The thick leathery leaves contain a large quantity of good strong fibre, which is used by the natives of New Zealand for making cloth, nets, &c. Considerable quantities of this flax (or hemp) are imported into Britain, being used for ropes, twine, &c. Cloth has also been made of it. The plant has been introduced into European culture.

Flaxman, JOHN, one of the most distinguished English sculptors, born at York 1755, died in London 1826. His earliest notions of art were derived from casts in



John Flaxman.

the shop of his father, who sold plaster figures, from many of which young Flaxman made models in clay. In 1770 he was admitted a student of the Royal Academy, and for some time earned a living by producing designs for Wedgwood the potter. In 1787 he went to Italy, where he remained seven years, and left many memorials of his genius, besides executing designs in outline to illustrate Homer, Dante, and Æschylus, an extensive series for each. In 1794 he returned to England, where he was diligently occupied with his professional pursuits until his death. He had been elected an associate of the Royal Academy in 1797, royal academician 1800, and in 1810 was appointed professor of sculpture to that institution. His works are very numerous, and are to be found all over the country; and a large collection of casts from the original models, &c., is preserved in University College, London.

Flea, a name for several insects regarded by entomologists as constituting a distinct order Aphaniptera, because the wings are inconspicuous scales. All the species of the genus are very similar to the common flea (*Pulex irritans*). It has two eyes and six feet; the feelers are like threads; the oral appendages are modified into piercing stilets and a suctorial proboscis. The flea is remarkable for its agility, leaping to a surprising distance, and its bite is very troublesome.

Fleabane, a name popularly given to several composite plants from their supposed power of destroying or driving away fleas, as the species of the genus *Conyza*, which were believed to have this power when suspended in a room. The common fleabane is *Pulicaria dysenterica*, found in moist sandy places in the south of England, whose smoke was supposed to expel fleas. The blue fleabane is *Erigeron acre*, common on dry banks.

Flea-beetle, the name given to different species of beetles which are destructive to plants. The turnip-flea (*Haltica nemŏrum*), whose larvæ are sometimes so destructive to the turnip crops, furnishes an example.

Flèche (flāsh), LA, a town in France, department of Sarthe, on the right bank of the Loir, 25 miles south-west of Le Mans. It contains a military college, occupying part of the extensive buildings of a former college belonging to the Jesuits. Pop. 7977.

Flecknoe (flek'nō), RICHARD, an English poet and dramatic writer, said to have been a Roman Catholic priest, contemporary with Dryden, and chiefly memorable for having had his name gibbeted by that satirist in the title of his satire against Shadwell. He died in 1678.

Fleece, GOLDEN. See *Argonauts* and *Jason*.

Fleece, ORDER OF THE GOLDEN. See *Golden Fleece*.

Fleet, a general name given collectively to the ships of a navy; also any number of ships, whether designed for war or commerce, keeping in company.

Fleet Marriages, irregular marriages performed without license by needy clergymen in the Fleet Prison, London, from about 1616 till they were suppressed by the Marriage Act of 1754. These clergymen were ready to marry any couples that came before

them for a fee proportioned in amount to the circumstances of those who were married. Sometimes a dram of gin was thought sufficient; at other times the fee was rather exorbitant. Registers of these marriages were kept by the officiating parties, and a collection of these books, purchased by government in 1821, amounted to between 200 and 300 large registers, and upwards of 1000 smaller books. These books were inadmissible as evidence in a court of justice.

Fleet Prison, once a celebrated prison in London till it was pulled down in 1845. It stood on the east side of Farringdon Street, and on this site a prison was in existence as early as the 12th century, which took its name from the creek or stream of the Fleet, on the bank of which it was erected. It was early used as a place of confinement for debtors, and served as such down to the period of its abolition. It was burned by Wat Tyler in 1381, at the Great Fire in 1666, and by the Gordon rioters in 1780. It was the scene of many disgraceful abuses, and was called by Pope the 'Haunt of the Muses,' from the number of poets who were confined in it.

Fleetwood, a seaport and watering-place in England, in the county of Lancaster, on the Wyre, near its entrance into Lancaster Bay, 18 miles north-west of Preston. It has a school of musketry and barracks. The harbour is safe and commodious. Pop. 9274.

Fleming, JOHN, D.D., Scottish naturalist, born near Linlithgow in 1785, died at Edinburgh 1857. He was successively minister of the parish of Bressay, in Shetland; professor of natural philosophy at King's College, Aberdeen, and professor of natural science at the New College, Edinburgh. He wrote a Report on the Economical Mineralogy of the Orkney and Zetland Islands; the Philosophy of Zoology; British Animals; and a large number of papers on zoology, palæontology, and geology contributed to the Encyclopædia Britannica, the Edinburgh Encyclopædia, the North British Review, &c.

Flemish Language and Literature. The Flemish or Vlaemisch language is a form of Low German, differing only slightly in pronunciation and orthography from the Dutch. It is spoken by a considerable number of the inhabitants of Belgium, especially in the provinces of East Flanders, West Flanders, Antwerp, Limburg, and Brabant. A fragment of a prose translation of the Psalms upwards of a thousand years old is the oldest extant specimen of the Flemish. The 'father of Flemish poetry,' Jakob Van Maerlant, wrote several romances dealing with Merlin and the Holy Grail, The Mirror of History, &c., in the 13th century; and a version of Reynard the Fox belongs to the same period. The 14th century was remarkable for the number of wandering poets, authors of knightly romances. The translation of the Bible, which is considered the standard for the construction and orthography of the language, was finished in 1618. The 18th century produced several good writers on philology, but was barren in poetic genius. The French almost annihilated the native literature, and it did not revive till the revolution of 1830, since which time it has been very vigorous. The leaders in this revival were Willems, Blommaert, Van Ryswyck, Conscience, Van Duyse, Snellaert, Snieders, De Laet, Dedecker, David, and Bormans.

Flemish School, OF PAINTING. See *Painting*.

Flensburg, formerly *Flensborg*, a town in Prussia, province of Schleswig-Holstein, at the west end of the fiord of same name, 20 miles N.N.E. of the town of Schleswig. It is now the most important town in Schleswig. Pop. 36,894.

Flers (flăr), a town in France, dep. Orne, 37 miles north-west of Alençon. It contains the remains of a fine old castle, and has manufactures of linen, bleach-works, &c. Pop. 11,257.

Flesh, a compound substance forming a large part of an animal, consisting mainly of the muscles, with connective tissue, and the blood-vessels and nerves, &c., supplying them. It consists chiefly of fibrin, with albumen, gelatin, hæmatosin, fat, phosphate of sodium, phosphate of potassium, phosphate and carbonate of calcium, sulphate of potassium, and chloride of sodium. The solid part is, besides, permeated by an alkaline fluid, called flesh-juice. It has a red colour, and contains dissolved a number both of organic and inorganic substances. The organic matter consists of albumen, casein, creatine and creatinine, inosic and several other acids; the inorganic, of alkaline sulphates, chlorides, and phosphates, with lime, iron, and magnesia.

Flesh-fly. See *Blow-fly*.

Fleta, a Latin commentary upon English law, said to have been written in the Fleet Prison in the reign of Edward I. It has been attributed to William de Brampton,

and also to Thomas de Weyland, J. de Lovetot, and Adam de Strutton.

Fletcher, Andrew, a Scottish political writer, the son of Sir Robert Fletcher, of Saltoun, born in 1653, died in London 1716. He opposed the court in the Scottish parliament, and had to retire to Holland. In 1685 he joined the enterprise of the Duke of Monmouth. He afterwards took refuge in Spain and in Hungary, and returned to England at the Revolution. He brought forward measures to secure the religion and liberties of the nation on the death of the queen (Anne), and carried various limitations of the prerogative, forming part of the Act of Security, rendered nugatory by the Scottish union, which he vehemently opposed.

Fletcher, Giles, brother to Phineas Fletcher and cousin to the dramatist John Fletcher, an English poet and clergyman, born 1580, died 1623. He published Christ's Victory and Triumph over Death, in 1620.

Fletcher, John. See *Beaumont* and *Fletcher*.

Fletcher, Phineas, brother to Giles, born 1584, died 1650. He entered Cambridge in 1600, and was rector of Hilgay, Norfolk. Among his works are The Locustes, or Appollyonists, a satire against the Jesuits; Sicelides, a dramatic piece; The Purple Island; and Piscatory Eclogues.

Fleur-de-lis (fl*eu*r-dė-lē'; Fr., 'flower of the lily'), in her. a bearing as to the origin of which there is much dispute, some authorities maintaining that it represents the lily, others that it represents the head of a lance or some such warlike weapon. The fleur-de-lis has long been the distinctive bearing of the kingdom of France.


Fleur-de-lis.

Fleurus (fl*eu*-rüs), a town of Belgium, province of Hainaut, 7 miles north-east of Charleroi. In the vicinity, in 1690, the French under Marshal Luxembourg defeated the Germans under Prince Waldeck; and in 1794 the French republican forces under Marshal Jourdan defeated the Austrian army. Pop. 5084.

Fleury (fleu-rē), André Hercule de, cardinal and prime-minister of Louis XV., was born in 1653, died in 1743. In 1698 Louis XIV. gave him the bishopric of Fréjus, and shortly before his death appointed him instructor to Louis XV. After the death of the regent in 1723 he proposed the Duc de Bourbon as first minister, but in 1726 he overturned the government which he had himself set up, and from that date kept the direction of affairs in his own hands. In the same year he was made a cardinal. The internal affairs of France prospered under his administration, but his foreign policy was unfortunate.

Fleury, Claude, French writer, born 1640, died 1723. He was educated in the Jesuit College at Clermont, and after beginning to practise as a lawyer resolved to take orders. In 1672 he became the tutor of the young princes of Conti, and afterwards associated with Fénelon in the education of the young dukes of Burgundy, Anjou, and Berri. In 1716 he became confessor to Louis XV. He had procured admission into the Academy in 1696 by several important works, among which the best known are his Histoire du Droit Français, Mœurs des Israélites, Mœurs des Chrétiens, Institution au Droit ecclésiastique, Histoire Ecclésiastique.

Fliedner (flēd'nėr), Theodore, D.D., German clergyman and philanthropist, born 1800, died 1864. He became pastor of Kaiserswerth in 1822, but found his life-work in prison reform; the institution of a Protestant order of deaconesses for the relief of the sick, the poor, and the fallen; and the establishment of schools, training colleges, &c.

Flight. See *Flying*.

Flinders, Matthew, English navigator, celebrated for his Australian discoveries, born in Lincolnshire 1774, died 1814. He went to Australia in 1795, and discovered Bass Strait in 1798. In 1801 he obtained from the British government the command of an expedition to explore the Australian coasts, in which he spent two years. Returning home he was taken prisoner by the French at Mauritius, and detained till 1810, after which he published his Voyage to Terra Australis. *Flinders Island* (off the N.E. coast of Tasmania) was named after him.

Flint, or Flintshire, a maritime county in North Wales, consisting of two separate portions, a larger and smaller, the latter being distant 6 miles S.E. from the main portion, and separated from it by Denbighshire; total area, 169,162 acres, of which three-fourths is under crops or in pasture. A range of hills of moderate elevation intersects the county lengthways S.W. to N.E.

There are numerous well-watered and fertile valleys, including a portion of the celebrated Vale of Clwyd. The county is rich in minerals, particularly lead, the mines of which are productive. Coal also abounds, and copper is obtained in considerable quantities. Flint returns one member to the House of Commons. Pop. 77,189.—The county town, FLINT, a parliamentary and municipal borough and seaport, is situated on the estuary of the Dee, 13 miles S.W. of Liverpool. In the vicinity are extensive alkali works and several lead and coal mines. There are also large copper works. The shipping trade of the port is small. A little N.E. of the town, on the shore of the estuary, stands the ancient castle of Flint, commenced by Henry II. and completed by Edward I. It was the prison of Richard II., and has remained in ruins since 1667. The *Flint Boroughs* include Flint, Holywell, Mold, and St. Asaph; they send one member to parliament. Pop. 5247.

Flint, a variety of quartz of a yellowish or bluish-gray or grayish-black colour. It is amorphous, and usually occurs in nodules or rounded lumps. Its surface is generally uneven, and covered with a whitish rind or crust, the result of weathering or of the action of water percolating through the rocks. It is very hard, strikes fire with steel, and is an ingredient in glass and in all fine pottery ware. The fracture of flint is perfectly conchoidal; though very hard it breaks easily in every direction, and affords very sharp-edged splintery fragments, formerly made into arrow-heads, &c. (See *Flint Implements.*) Its true native place is the upper bed of the chalk formation, in which it is formed as a series of concretions, the silica in sponges and in other marine animals which lived on the sea floor while the chalk was being deposited being attracted into nodules.

Flint-glass, a species of glass, so called because pulverized flints were originally employed in its manufacture. It is extensively used for domestic purposes. Its dispersive power in regard to light renders it invaluable in the manufacture of the object-glasses of telescopes and microscopes, as by combining a concave lens of flint-glass with one or two convex lenses of crown-glass, which possesses a much less dispersive power, a compound lens is formed in which the prismatic colours arising from simple refraction are destroyed, and the lens rendered achromatic. Quartz and fine sand are now substituted for flint in the manufacture of this glass.

Flint Implements, implements of flint used by man while unacquainted with the use of metals. For such implements granite, jade, serpentine, jasper, basalt, and other hard stones were also used, but the most numerous were formed of flint. They consist of arrow-heads, axe-heads, lance-heads, knives, wedges, &c. (See *Celts.*) Flint implements are still used by some savage tribes.

Flint-lock, a musket-lock in which fire is produced by a flint striking on the steel pan, now superseded by locks on the percussion principle.

Floating Batteries, batteries erected either on simple rafts or on the hulls of ships, for the defence of a coast or for the bombardment of an enemy's ports. They were used notably at the siege of Gibraltar (1779–83) and during the Russian war (1854).

Floating Breakwater. See *Breakwater.*

Floating Docks. See *Docks.*

Floating Island, an island formed in a lake or other inland water, consisting generally of a mass of earth held together by interlacing roots. Sometimes such islands are large enough to serve as pasture grounds. Artificial floating islands have been formed by placing lake mud on rafts of wickerwork covered with reeds.

Floating Quartz, or FLOATSTONE, a porous variety of quartz of a spongy texture, whitish-gray in colour, so light as to float in water. It frequently contains a nucleus of common flint.

Flobecq (flō-bek), a town of Belgium, prov. of Hainaut, 20 miles N.E. of Tournai. Pop. 5200.

Flock, the refuse of cotton and wool, or the shearing of woollen goods, &c., used for stuffing mattresses, furniture, &c. *Flock-paper* is a kind of wall-paper, having raised figures resembling cloth, made of flock, or of cloth cut up very fine, and attached to the paper by size or varnish.

Flodden, a village of England, in Northumberland, about 5 miles S.E. of Coldstream. Near it was fought the celebrated battle in which James IV. of Scotland was defeated by the Earl of Surrey (Sept. 9, 1513). The loss of the Scots was from 8000 to 10,000 men, including the king, the Archbishop of St. Andrews, and a large number of the nobles; that of the English from 6000 to 7000. At the begin-

ning of the battle the armies mustered respectively 30,000 and 32,000 men. The English victory was so near a defeat that Surrey was unable to prosecute the war with any vigour.

Flogging, the infliction of stripes or blows with a whip, lash, or scourge, especially as a judicial punishment. In Britain it long existed as a punishment in the army and navy; but it was totally abolished in the former in 1881, and in the latter it is practically extinct. It was made a punishment for certain violent crimes, such as garroting, in 1863; and for juvenile offenders in 1847 and 1850. The punishment of the knout in Russia and of the bastinado in the East are severe forms of this punishment.

Flood, HENRY, Irish orator and politician, born near Kilkenny 1732, died 1791. He entered the Irish parliament in 1759, was privy-councillor for Great Britain as well as for Ireland in 1775, vice-treasurer for Ireland 1775–81. In 1783 he had a personal dispute in the house with Grattan, when a remarkable display of the power of invective was made on both sides. He afterwards became a member of the British parliament. His speeches and some poetical pieces have been published.

Floor-cloth, a useful substitute for carpet, the basis of which is a strong open canvas. It is woven 6 to 8 yards wide, and in lengths of from 100 to 150 yards. A length of 60 to 100 feet of canvas is stretched in a frame, brushed with glue-size, and rubbed with pumice-stone. It then receives two or three foundation coats of paint on each side. Each coat on the front is smoothed with pumice-stone. When this operation is completed the cloth is transferred to the printing-room, where the pattern is printed in oil colours by blocks, as in calico-printing.

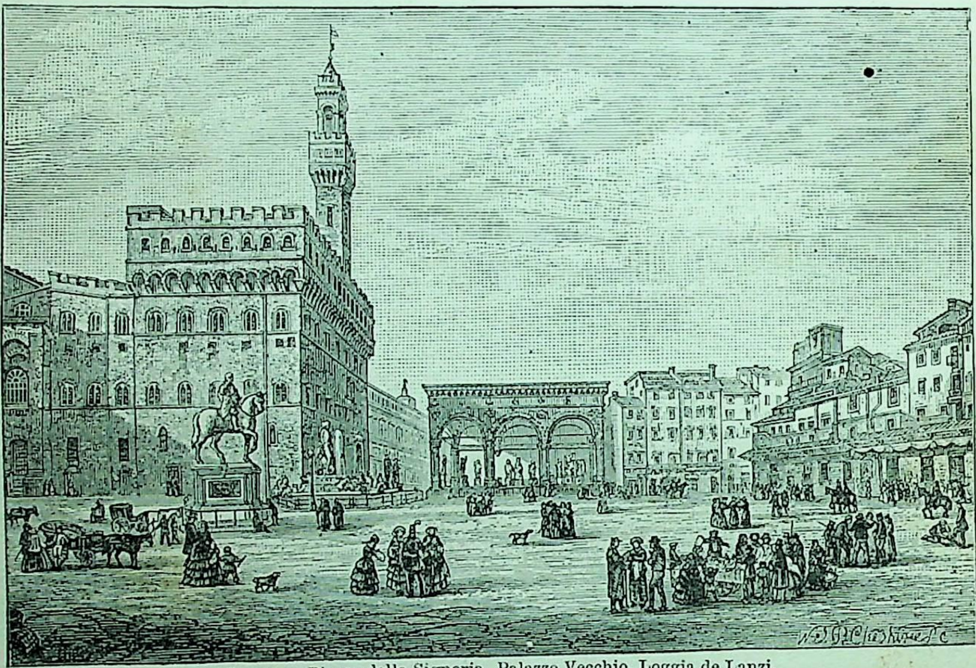
Flora, the Roman goddess of flowers and spring, whose worship was established at Rome in the earliest times. Her festival, the Floralia, was celebrated from April 28 to May 1 with much licentiousness. In botany, *flora* signifies the plants of a region collectively, as *fauna* signifies the animals.

Floral Games. See *Jeux Floraux*.

Floréal (flō-rā-āl; month of flowers), the eighth month in the calendar of the French revolution. It began April 20, and ended May 19.

Florence (Italian, *Firenze;* in old Italian and in poetry, *Fiorenza;* ancient *Florentia Tuscorum*), a celebrated city of Italy, capital of a province of same name, 143 miles north-west from Rome, and 50 miles E.N.E. from Leghorn. The city is surrounded by hills, and is beautifully situated on both banks of the Arno, but the greater part of it lies on the right bank. Six bridges connect the banks of the Arno: the Ponte alle Grazie, constructed 1235, restored 1835; the Ponte Vecchio, said to date from the Roman period, reconstructed 1362, and consisting of three arches, on which are rows of shops, and over which a covered way is carried to connect the Pitti Palace and the Uffizi; the Ponte Santa Trinità, erected soon after 1567, adorned with statues; the Ponte alla Carraja, 1218, restored in 1337, and again in 1559. There are, besides, two suspension bridges. On either side of the Arno is a spacious quay called the Lung' Arno, a favourite promenade. The private dwellings are mostly handsome, and the palaces, of which there are many, are noble and impressive structures. The city contains numerous piazzas or squares, the most important of which is the Piazza della Signoria, surrounded by important buildings, and adorned with a marble fountain, and a bronze statue of Cosmo I. by John of Bologna. In this piazza is situated the Palazzo Vecchio, originally the seat of the government of the republic, and subsequently the residence of Cosmo I. The most remarkable building in Florence is the Duomo, or cathedral of St. Maria del Fiore, erected 1298–1474, but its façade not completed till 1887, surmounted by the magnificent dome of Brunelleschi, and situated in a spacious square nearly in the centre of the city. Near the cathedral are the campanile designed by Giotto, and the small church of St. John (San Giovanni), the Baptistery, the three bronze gates of which, with figures in high relief, are celebrated as among the most beautiful works of the kind extant. One of these is by Andrea Pisano, the two others by Ghiberti. The church of S. Croce is the burial-place of many of the most eminent Tuscans, contains much fine sculpture and many interesting tombs, amongst others those of Michael Angelo Buonarotti, Galileo, Machiavelli, and Alfieri. In the Piazza S. Croce stands Dante's monument by Pazzi, inaugurated 1865. The chief art collection is the Galleria degli Uffizi. In this gallery are contained specimens of painting and statuary by the greatest masters in these arts. In statuary, among numerous antiques may be specified the Venus de' Medici, the Apollino, the Knife-grinder, the

Dancing Faun, the Wrestlers, and the group of Niobe and her Children; and in painting there are works by Michael Angelo, Raphael, Titian, Fra Angelico, Fra Bartolomeo, Andrea del Sarto, Correggio, Guido, and numerous others of the first names in various schools. Other important art collections are preserved in the various churches and palaces, one of the principal being that in the Pitti Palace. The building formerly known as the *Bargello*, erected about 1250 for the chief magistrate of the republic, and subsequently used as a prison, has recently been restored, and is now opened as a national museum, illustrative of the history of Italian culture and art in medieval and modern times. The Laurentian or Medicean Library contains upwards of 9000 ancient MSS. The Magliabecchian Library is the great repository of printed books. The



Florence—Piazza della Signoria, Palazzo Vecchio, Loggia de Lanzi.

Biblioteca Marucelliana and the Biblioteca Riccardiana are also important public libraries. The charitable institutions are numerous and important. Schools and other literary and educational establishments are also numerous. The manufactures have greatly fallen off, but still embrace woollens, silk, straw-hats, porcelain, mosaics, and numerous objects in the fine arts.

Florence was probably founded by the Romans in the 1st century B.C., and early attained considerable prosperity. During the dark ages it was frequently devastated, but it revived about the beginning of the 11th century, at which time the Florentines became extensive European traders. Their silk and woollen fabrics excelled, and their skill as workers in gold and jewels was unsurpassed. About this time Florence took an active part in the feud which broke out between the Guelphs and Ghibellines, the town generally supporting the former against the imperial party. In 1283 a species of republic was constituted; but about the year 1300 the party struggles again burst forth between the same rival families under the new names of the *Whites* and the *Blacks*, in which the Blacks (the Guelphs) were eventually victorious, and the Whites, among whom was the poet Dante, banished. In the course of these troubles a family of merchants named the Medicis rose to great influence in Florentine politics. One of them, Cosmo, born 1389, was the founder of the political greatness of his house. His grandson Lorenzo, surnamed *Il Magnifico*, as a statesman, scholar, and patron of art and literature, attained the highest celebrity. Under him

Florence, which, though calling itself a republic, was in reality ruled by him, rose to a great pitch of opulence and power, and notwithstanding the hostility of the pope he exercised a great influence throughout Italy. On the fall of the republic in the 16th century a member of a lateral branch of the Medici, the line of Cosmo having become extinct, was placed by Charles V. as Duke of Florence. The ducal dynasty of Medici continued to rule till the year 1737, when, becoming extinct, they were succeeded by Francis of Lorraine, afterwards emperor of Germany. From this period the history of Florence merges into that of Tuscany until its amalgamation with the Kingdom of Italy. From 1865 till 1871 it held the dignity of capital of the kingdom, the seat of government being transferred to it from Turin. Amongst the illustrious men it has produced are Dante, Petrarch, Boccaccio, Guicciardini, Lorenzo de' Medici, Galileo, Michael Angelo, Leonardo da Vinci, Benvenuto Cellini, Andrea del Sarto, Amerigo Vespucci, Macchiavelli, and others. Pop. (including suburbs), 200,300. — The province has an area of about 2262 English square miles. The surface is beautifully diversified by mountains, valleys, and plains. The climate is generally mild and healthy, and the soil very fertile. Pop. 819,531.

Florence, Council of, along with that of Ferrara, a continuation of the Council of Basel. At Florence its sessions continued at intervals from 1439 to 1442. Its object was a reunion of the eastern and western churches; but the seeming agreement come to was soon after repudiated by a council at Constantinople.

Florence Flask, a globular, long-necked flask of thin glass, of the kind that *Florence oil* (that is olive-oil) and Tuscan wine are contained in.

Florentine Work, a kind of mosaic work, consisting of precious stones and pieces of white and coloured marble, which has long been produced in Florence. It is applied to jewellery, and used for table tops, &c.

Flo'res, or Floris, an island of the Indian Archipelago, one of the chain which extends east from Java. It is about 230 miles long and from 15 to 35 miles wide, and has a mountainous surface, with several volcanic peaks. The natives are tall and robust frizzly-haired savages, belonging to the dark Papuan race. The island is under Dutch supremacy. Sandal-wood, bees'-wax, and horses are exported. The passage between the east end of the island and those of Solor and Adenara is called Flores Strait; and the part of the Pacific north of the Flores chain and south of Celebes is called the Flores Sea.

Flo'res, the most westerly island of the Azores, about 30 miles long by 9 miles broad, with a hilly surface. The chief products are wheat, pulse, and poultry, and great numbers of small cattle are reared. Pop. about 10,000.

Flor'et, a single small flower in a compact inflorescence, as in the compound flower of the Compositæ, or in the spikelet of grasses.

Florian, Jean Pierre Claris de, French writer, born 1755, died 1794. He was patronized by Voltaire, and gained fame as a writer of fables, pastorals, romances, and comedies. He was imprisoned during the revolution, but the fall of Robespierre saved him from the guillotine. His romances Galatée, Estelle, Gonzalve de Cordoue, Numa Pompilius, his fables, and translation of Don Quixote are his best works.

Florian, St., the patron saint of Poland, born about 190, died by drowning during the Diocletian persecution, 230. He is represented as pouring out flames from a vessel, and his protection is sought against fire.

Floriculture, the culture or cultivation of flowers or flowering plants, whether in open beds, in gardens, in conservatories or greenhouses, or in rooms in dwelling-houses.

Flor'ida, one of the United States, forming the south-eastern extremity of the country, and having the Gulf of Mexico on the south and west, and the Atlantic on the east. It consists partly of a peninsula stretching s. for about 400 miles, partly of a long, narrow strip of land running along the Gulf of Mexico to a distance of 350 miles from the Atlantic coast-line. The peninsula is about 90 miles in width, and contains about four-fifths of the total area, which is 59,268 sq. miles. The surface is in general level, rising little above the sea, especially in the southern parts, where it is almost one continued swamp or marsh. The northern portion is more broken and elevated, but the whole coast is flat. The principal river is the St. John's, flowing northwards through peninsular Florida to the Atlantic. Its tributary, the Ocklawaha, has its course so flat that for a long distance it spreads out into the forest for half a mile or more on either side, so that nothing is seen but trees and water. The Appalachicola, Suwanee, &c., flow into the Gulf of Mexico. There are many lakes throughout the peninsula,

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the largest being Okeechobee (area 650 sq. miles). Numerous islands are scattered along the south and west coasts, the most remarkable of which is a group, or rather a long chain, called the Florida Keys at the southern extremity of Florida. The most important of these is Key West, containing the city and naval station of same name. The state produces tropical plants and fruits in great perfection, especially oranges, lemons, limes, shaddock, &c. The planting of orange groves has been carried on extensively in recent times, and oranges are now a speciality of Florida. Tobacco, cotton, sugar, maize, potatoes, rice, oats, &c., are among the other productions. The forests form an important source of wealth. The minerals are unimportant. The wild animals comprise panthers, cougars, wolves, bears, foxes, raccoons, opossums, deer, &c. Birds are extremely numerous and various. The coasts, rivers, and lakes swarm with fish; tortoises and turtles also abound. The swamps and other inland waters are infested with alligators. Snakes are numerous, but most of them are harmless. The climate in general is excellent, and the state is much frequented as a winter health resort for invalids, many large and elegant hotels having been built for the accommodation of visitors. Florida, long in a backward condition, has recently made great advances in prosperity, being now well supplied with means of communication, and towns and villages rapidly springing up. Tallahassee is the capital and seat of government, but the largest town is Key West (pop. 18,000); Jacksonville and Pensacola are thriving ports; St. Augustine is the oldest town in the United States. Proposals have been made to construct a ship-canal through Florida as a short route from the Atlantic to the Gulf of Mexico. Florida was first explored in 1512 and 1516 by Ponce de Leon, a Spanish adventurer. It was ceded to Great Britain by Spain in 1763 in exchange for Cuba; reacquired by the Spaniards in 1781, and confirmed to them at the peace of 1783. It was ceded to the United States in 1821, and organized as a territory in 1822. A long series of conflicts with the Seminole Indians retarded its prosperity. In 1845 it was admitted into the Union. In 1861 it seceded from the Union, to which it was not readmitted till 1868. Pop. in 1870, 187,748; in 1880, 267,351, of whom 141,249 were white and 125,317 coloured; in 1890, 391,422, 166,473 being coloured.

Florida, GULF OF, the narrow sea between Florida, Cuba, and the Bahama Islands.

Florida Keys. See *Florida.*

Florid'eæ, a name given to the rose-spored algæ, now more generally known as rhodosperms.

Florid Gothic, that highly-enriched variety of Gothic architecture which prevailed in England in the 15th and at the beginning of the 16th century; often called the *Tudor style*, as it prevailed chiefly during the Tudor era.

Florin, a name given to different coins of gold or silver of different values, and to moneys of account, in different countries. The English florin is 2*s.* or one-tenth of a pound sterling; the Austrian *gulden* or florin and the *guilder* or florin of Holland are each 1*s.* 8*d.* A gold florin, value 6*s.*, was used in England in the reign of Edward III.

Florinians, a sect of Gnostics of the 2d century, so called from *Florinus*, a Roman priest who was excommunicated by Pope Eleutherius in 176.

Florio, JOHN, lexicographer and translator, born in London of Italian parents in 1553, died 1625. He taught French and Italian in Oxford University. He was appointed by James I. teacher of languages to the queen and Prince Henry. His chief works are his Italian and English Dictionary, the World of Words, and his translation of Montaigne. Shakespeare is said to have ridiculed him in the character of Holofernes in Love's Labour's Lost.

Floris, FRANS, a Flemish painter, whose family name was Vriendt, born at Antwerp in 1520, died there 1570. At Antwerp he established a school for painters, which produced many eminent artists. His chief works are: The Fall of the Rebel Angels, in the Louvre; The Last Judgment, in the church of Notre Dame, Brussels; and The Assumption, in Antwerp Cathedral. Other works are to be met with in Flanders, Holland, Spain, Paris, Vienna, and Dresden.

Florus, ANNÆUS, a Roman historian, was probably a native of Spain or Gaul. He is variously styled in the MSS.: in some *L. Annæus Florus*, in others *L. Julius Florus*, in others *L. Annæus Seneca*, and in one simply *L. Annæus.* He lived in the beginning of the second century after Christ, and wrote an epitome of Roman history in four books, from the foundation of the city to the first time of closing the temple of Janus, in the reign of Augustus.

Floss-silk, the portions of ravelled silk broken off in reeling the silk from the cocoons, carded and spun into a soft coarse yarn, and used for common fabrics, embroidery, &c.

Flotow (flō'tō), FRIEDRICH ADOLPHUS VON, German musical composer, born 1812, died 1883. He studied music in Paris, but his earlier operas did not find favour with the Parisian opera-house directors, so he had to content himself with performances in the aristocratic private theatres. At length the Naufrage de la Méduse was successfully produced at the Renaissance Theatre in 1839. This was followed by L'Esclave de Camoëns (1843), and L'Âme en Peine (1846), performed in London as Leoline. Alessandro Stradella was first performed at Hamburg in 1844, and his most successful work, Martha, at Vienna in 1847. Among his other works are Indra (1853), La Veuve Grapin (1859), L'Ombre (1869), and L'Enchanteresse (1878). He was director of the court theatre at Schwerin from 1855 to 1863; the last years of his life were chiefly spent at Vienna.

Flotsam, JETSAM, AND LIGAN, in law. *Flotsam*, or *floatsam*, is derelict or shipwrecked goods floating on the sea; *jetsam*, goods thrown overboard which sink and remain under water; and *ligan*, goods sunk with a wreck or attached to a buoy, as a mark of ownership. When found such goods may be returned to the owner if he appear; if not, they are the property of the crown.

Flounder, one of the flat-fishes, family Pleuronectidæ, genus *Pleuronectes* or *Platessa*, the common flounder being the *Pleuronectes* or *Platessa flesus*. It is one of the most common of the flat-fishes, and is found in the sea and near the mouths of large rivers all round the British coast. Flounders indeed have been successfully transferred to fresh-water ponds. They feed upon crustacea, worms, and small fishes, and are much used as food. The Argus-flounder is the *P. argus*, a native of the American seas.

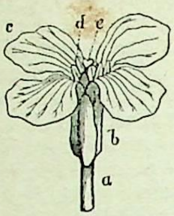
Flour, the edible part of wheat, or any other grain, reduced to powder, and separated from the bran and the other coarser parts by sifting. The quality of flour depends principally on the fineness of the sieves through which it is passed and the amount of bran which it contains. The finest flour is obtained in the first grinding of the wheat. The other kinds—biscuit flour, middlings, seconds, &c.—consist of the flour which remains after the first grinding, ground and passed through coarser sieves.

Flourens (flō-rāṉ), GUSTAVE, French socialist, born at Paris 1838, died 1871. In 1863 he was deputy professor in the College of France, and published his lectures under the title of Histoire de l'Homme. After being engaged in democratic movements in Turkey and Italy he joined the Paris Commune in 1871, and was killed in a conflict at Rueil, near Malmaison.

Flourens, MARIE JEAN PIERRE, French physician and physiologist, born 1794, died 1867. In 1828 he was elected a member of the Academy of Sciences, in 1832 was appointed to the chair of comparative anatomy at the Jardin des Plantes, Paris. In 1833 he became permanent secretary to the Academy of Sciences, in 1840 member of the French Academy. In 1846 he was created by Louis Philippe a peer of France. His works include Expériences sur la Système Nerveux, Developpement des Os, Anatomie de la Peau, Mémoires d'Anatomie et de Physiologie Comparées, De l'Instinct et de l'Intelligence des Animaux, De la Vie et de l'Intelligence (1858).

Flower, in popular language, the blossom of a plant, consisting chiefly of delicate and gaily-coloured leaves or petals; in botany, the organs of reproduction in a phenogamous plant. A complete flower consists of *stamens* and *pistils* together with two sets of leaves which surround and protect them, the *calyx* and *corolla*. The stamens and pistils are the essential organs of the flower. They occupy two circles or rows, the one within the other, the stamens being in the outer row. The stamens consist of a stalk or *filament* supporting a roundish body, the *anther*, which is filled with a powdery substance called the *pollen*. The pistil consists of a closed cell or *ovary* at the base, containing *ovules*, and covered by a *style* which terminates in the *stigma*. These organs are surrounded by the corolla and calyx, which together are called the *floral envelope*, or when they both display rich colouring the *perianth*. The leaves of the corolla are called *petals*, and those of the calyx *sepals*. Some flowers want the floral envelope, and are called *achlamydeous;* others have the calyx but are without the corolla, and are called *monochlamydeous*. Flowers are generally *bisexual*, but some plants have *unisexual* flowers; that is, the pistils are in one

flower and the stamens in another. See also *Botany*. The figure shows the flower of *Cheiranthus Cheiri* (common wallflower): *a*, peduncle; *b*, calyx; *c*, corolla; *d*, stamens; *e*, pistil.



Parts of Flower.

Flower-de-lis. See *Fleur-de-lis*.

Flowering-fern, the popular name of *Osmunda regālis*, nat. order Osmundaceæ. It is the noblest and most striking of the British ferns, and grows in boggy places and wet margins of woods. It derives its name from the upper pinnæ of the fronds being transformed into a handsome panicle covered with sporangia.

Flowering-rush (*Butŏmus umbellātus*), nat. order Butomaceæ, a beautiful plant found in pools and wet ditches of England and Ireland, but rare in Scotland. The leaves are 2 to 3 feet long, linear, triangular, their sharp edges sometimes cutting the mouths of cattle, whence their generic name *Butŏmus* (ox-cutting). The scape or flower-ing stem terminates in a large umbel of rose-coloured flowers.

Flowers, formerly a chemical name for fine particles of bodies in the form of a powder or mealy substance, as the *flowers of sulphur*, &c.

Flowers, ARTIFICIAL, imitations of real flowers, made of various materials. These are not a modern invention. The Romans excelled in the art of imitating flowers in wax, and in this branch of the art attained a high degree of perfection. The Egyptian artificial flowers were made of thin plates of horn stained in different colours, sometimes also of leaves of copper gilt or silvered over. In modern times the Italians were the first to acquire celebrity for the skill and taste they displayed in this manufacture, but they are now far surpassed by English and French manufacturers, but more especially by the latter. Among materials used in this manufacture are cambric, muslin, satin, velvet, and other woven fabrics, feathers, india-rubber, blown glass, mother of pearl, brass, &c.

Fluid, a body whose particles on the slightest pressure move and change their relative position without separation; a liquid or a gas, as opposed to a *solid*. Fluids are divided into *liquids*, such as water and bodies in the form of water; and *gaseous bodies* or aeriform fluids. Liquids have been also termed *non-elastic fluids*, for although they are not altogether void of elasticity, they possess it only in a small degree. Air and aeriform bodies have been called *elastic fluids* on account of their great elasticity.

Flukes, or FLUKE-WORMS, a name given to certain parasitic Scolecida (tape-worms, &c.), belonging to the division of Platyelmia or Flat-worms, and included in the order Trematoda. They inhabit various situations in different animals—mostly in birds and fishes. The *Distŏma hepaticum* exists in large numbers in the livers of sheep, and causes the disease known as 'rot.' Like the tape-worms the flukes pass through an elaborate development.

Fluohy'dric Acid, same as *Hydrofluoric acid*.

Fluores'cence, a name given to the phenomena presented by the invisible chemical rays of the blue end of the solar spectrum when they become luminous and visible by being sent through uranium glass, or solutions of quinine, horse-chestnut bark, or *Datūra Stramonium*. In this way green crystals, as of fluor-spar, may give out blue rays, due not to the colour of the surface of the body, but to its power of modifying the rays incident on it. The phenomenon appears to be identical with *phosphorescence*. It is due to the refrangibility of the rays being lowered or degraded by the action of the substance. The term fluorescence is applied to the phenomenon if it is observed while the body is actually exposed to the source of light; *phosphorescence* to the effect of the same kind, but usually less intense, which is observed after the light from the source is cut off. Both forms of the phenomenon occur in a strongly-marked degree in the same bodies. Canary-glass, which is coloured with oxide of uranium, is a very convenient material for the exhibition of fluorescence. A thick piece of it held in the violet or ultra-violet portion of the solar spectrum is filled to the depth of from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch with a faint nebulous light. If the solar spectrum be thrown upon a screen freshly washed with sulphate of quinine, the ultra-violet portion will be visible by fluorescence; and if the spectrum be very pure, the presence of dark lines in this portion will be detected. For a similar phenomenon, presented by the ultra-red rays of the spectrum, see *Calorescence*.

Flu'oride, in chemistry, a compound obtained by heating hydrofluoric acid with certain metals, by the action of that acid

on metallic oxides or carbonates, by heating electro-negative metals, as antimony, with fluoride of lead or fluoride of mercury, and in other ways.

Flu′orine, a very widely distributed element, which is known chiefly only in combination, though it has recently been isolated by De Moissan as a colourless gas, that attacks almost every substance and is the most active element known. Its most abundant compound is calcic fluoride, which not only exists in the mineral kingdom as fluor-spar (which see), but forms an essential part of the bones and teeth of animals. Fluorine has also been detected in the blood, milk, and urine; in plants; in volcanic sublimates; in rocks; in coprolites and mineral phosphates; and in a variety of minerals. Combined with hydrogen it forms hydrofluoric acid.

Fluor-spar, DERBYSHIRE SPAR, or FLUORINE (CaF_2), fluoride of calcium, a common mineral found in great beauty in Derbyshire. It generally occurs massive, but crystallizes in simple forms of the monometric system—viz. the cube, octahedron, dodecahedron, &c., and in combinations of the cube and octahedron. Pure fluor-spar contains 48·7 per cent fluorine, 51·3 calcium. It is of frequent occurrence, especially in connection with metalliferous beds, as of silver, tin, lead, and cobalt ores. It is sometimes colourless and transparent, but more frequently it exhibits tints of yellow, green, blue, and red. From the general prevalence of a blue tint in the Derbyshire specimens it is there known as *Blue-john*. It is often beautifully banded, especially when in nodules, which are much prized for the manufacture of vases, and it is made into a great variety of articles, chiefly ornamental. It is used as a flux in metallurgy, and is a source of hydrofluoric acid. Its specific gravity is 3·14, but it is of very inferior hardness (4), being scratchable by apatite.

Flushing (Dutch, *Vlissingen*), a seaport in Holland, province of Zeeland, on the island of Walcheren, at the mouth of the Hond, or West Schelde, here between 2 and 3 miles broad. It is strongly fortified, and has an extensive trade. Pop. 10,288.

Flustra, a genus of Polyzoa, the sea-mats (which see).

Flute, a portable musical instrument, consisting of a tube furnished with six holes for the fingers, and from one to fourteen keys which open other holes. The sound, which is soft and clear in quality, is produced by blowing with the mouth into an oval aperture at the side of the thick end of the instrument. Its useful compass is about two and a half octaves, including the chromatic tones. It is usually made in four pieces, and of box or ebony, sometimes, however, of ivory, silver, or even of glass.

Fluting, in architecture, channels or furrows cut perpendicularly in the shafts of columns. It is used in the Doric, Ionic, Corinthian, and Composite orders, but never in the Tuscan. When the flutes are partially filled up by a smaller round moulding they are said to be *cabled*.

Flux, a substance or mixture added to assist the fusion of minerals. In the large way, limestone and fluor-spar are used as fluxes. In the smelting of iron the flux must be such that it will combine with the earthy matter of the ore, and form a slag, which must neither be too refractory nor fusible. The fluxes made use of in assays or chemical experiments consist usually of alkalies and alkaline salts, as borax, cyanide of potassium, carbonate of potassium, carbonate of sodium, common salt, which render the earthy mixtures fusible by converting them into glass. The fluxes used in pottery are various, but almost all consist of litharge or red-lead, borax, carbonates of potassium and sodium, and sand.

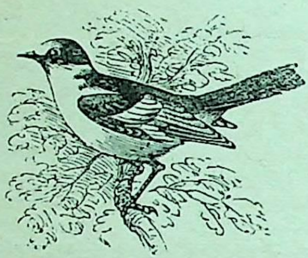
Fluxions, in mathematics, the analysis of infinitely small variable quantities, an old method of calculation first invented by Newton, which does not essentially differ from that employed in the differential calculus invented by Leibnitz, except in the notation. Newton's notation was adhered to by English writers up to the early part of the present century, but the differential calculus is now universally employed.

Fly, a winged insect of various genera and species, whose distinguishing characteristics are that the wings are transparent and have no cases or covers. By these marks flies are distinguished from beetles, butterflies, grasshoppers, &c. The true flies or Diptera have only two wings, viz. the anterior pair. In common language, *fly* is the house-fly, of the genus *Musca*. The house-fly is found wherever man is, and in hot weather causes a good deal of annoyance. It is furnished with a suctorial proboscis, from which, when feeding on dry substances, it exudes a liquid, which, by moistening them, fits them to be sucked. From its feet being beset with hairs, each terminating in a disc which is supposed to act as a sucker, it

can walk on smooth surfaces, as a ceiling, even with its back down. The female lays her eggs in dung or refuse; the larvæ are small white worms. They change into pupæ without casting their skins, and in from eight to fourteen days the perfect fly emerges. The very small flies and the very large ones often seen about houses belong to other species. See *Blow-fly*, *Bot-fly*, *Gad-fly*.

Fly, a name formerly given to a double-seated carriage or public conveyance; afterwards applied to hackney-carriages or cabs.

Fly-catcher, a name originally given to certain insessorial birds of the genus *Musci-*



White-collared Flycatcher (*Muscicăpa albicollis*).

căpa, tribe Dentirostres, with a bill flattened at the base, almost triangular, notched at the upper mandible, and beset with bristles. Two species are British—the spotted fly-catcher (*M. grisŏla*) and the pied fly-catcher (*M.* (or *Ficedŭla*) *atricapilla*), both about the size of a sparrow. They perch on a branch, where they remain immovable watching for insects, only leaving to make a sudden dart at a passing fly, which they seize with a snap of the bill, and then return. The white-collared fly-catcher (*M. albicollis*) is a native of southern Europe. Numerous other birds receive the name of fly-catchers, and some, as the paradise fly-catchers of the Old World, are brilliantly coloured. In America some of the tyrant birds (Tyrannidæ) are named fly-catchers.

Flying, the power of locomotion through the air, possessed by various animals in different degrees. Birds, bats, and many insects can raise themselves into the air and sustain themselves there at will. Squirrels, phalangers, some lizards, one of the tree-frogs, and flying-fish can move through the air in one direction for a short time, but cannot, strictly speaking, fly. The wing of a bird or insect is an elastic flexible organ, with a thick anterior and a thin posterior margin; hence the wing does not act like a solid board, but is thrown into a succession of curves. When a bird rises from the ground it leaps up with head stuck out and expanded tail, so that the body is in the position of a boy's kite when thrown up. The wings are strongly flapped, striking forwards and downwards, and the bird quickly ascends. It has been shown that the wing describes a figure of 8 in its action, the margin being brought down so that the tip of the wing gives the last blow after the part next the trunk has ceased to strike; hence, standing in front of a bird, the wing would be divided into two, the upper surface of one half and the lower surface of the other being visible at the same time. These portions are reversed when the wing is drawn back and towards the body, before beginning another stroke; but it will be observed that during retraction the wing is still sloped, so that the resemblance to a kite is maintained. There are many varieties of flight among birds; of these the most remarkable is the sailing motion, in which the wings are but slightly moved. Probably the original impetus is maintained by the kite-like slope of the wing, and advantage may be taken of currents by a rotation of the wing at the shoulder, a movement invisible at any distance. If the extinct Pterodactyles are excepted, all animals other than birds, bats, and insects, which move through the air, as squirrels, flying-dragons, &c., do so as parachutes, going from higher to lower levels, but never rising, nor flying horizontally.

Flying, ARTIFICIAL. See *Aëronautics*.

Flying-bridge, a bridge made of pontoons, light boats, hollow beams, casks, or the like. They are made as occasion requires, chiefly for the passage of troops. The term is also applied to a kind of ferry in which the force of the current of a river is applied to propel a boat guided by a cable fastened from the one side to the other.

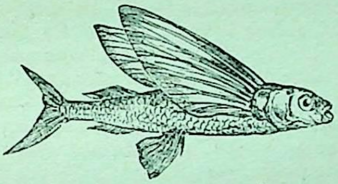
Flying-buttress. See *Buttress*.

Flying-dragon, or FLYING-LIZARD. See *Dragon*.

Flying Dutchman, a phantom ship said to be seen in stormy weather off the Cape of Good Hope, and thought to forebode ill luck. One form of the legend has it that the ship is doomed never to enter a port on account of a horrible murder committed on board; another, that the captain, a Dutchman, swore a profane oath that he would weather the Cape though he should beat there till the last day. He was taken at his word, and there he still beats, but never succeeds

in founding the point. He sometimes hails vessels and requests them to take letters home from him. The legend is supposed to have originated in the sight of some ship reflected from the clouds. It has been made the groundwork of one or two novels, and an opera by Wagner.

Flying-fish, a name common to various fishes which have the power of sustaining themselves for a time in the air by means of their large pectoral fins. Generally, however, the name is limited to the species of the genus *Exocœtus*, which belongs to the family Scŏmberesocidæ (mackerel-pikes). The pectoral fins, which are very large, are the principal instruments in their flight, serving to sustain the fish temporarily in the air after it has acquired an initial velocity in its rush through the water. It can pass through the air to a considerable distance, sometimes as much as 200 yards, which it does to escape from the attacks of other fishes, especially the dolphin. It is most common between the tropics. The best-known species are *E. volitans*, abundant in the warmer parts of the Atlantic, and *E. exiliens* of the Mediterranean. By



Common Flying-fish (*Exocœlus volitans*).

some naturalists this genus has been subdivided into several, characterized by the presence or absence of barbels.

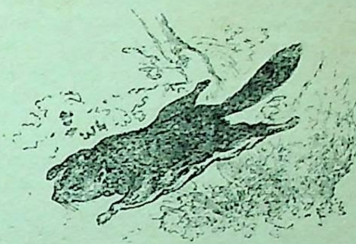
Flying-fox. See *Fox-bat.*

Flying-lemur, a name given to insectivorous mammals, natives of the Indian Archipelago and belonging to the genus *Galeopithĕcus*. They possess a flying membrane, which extends as a broad expansion from the nape of the neck to the tail. By means of this membrane they can take extended leaps from tree to tree.

Flying-phalanger, a popular name of the members of a genus of nocturnal marsupials (*Petaurus*) nearly allied to the true phalangers. A fold of the skin extends along the flanks, and this acting as a parachute enables the animal to leap great distances, its heavy tail serving as a rudder to guide its course in the air. These animals inhabit New Guinea and Australia, where they are known as 'flying-squirrels.' The species vary in size, the smallest being no bigger than a mouse. They feed on fruit, leaves, insects, &c.

Flying-squid, the popular name of a genus of cephalopodous molluscs (*Ommastrĕphes*), allied to the calamaries or squids, having two large lateral fins, which enable them to leap so high out of the water that they sometimes fall on ships' decks.

Flying-squirrel (*Pterŏmys*), a genus of



European Flying-squirrel (*Pterŏmys sibericus*).

rodent animals, family Sciuridæ (squirrels), to which the skin of the flank, extending between the fore and hind legs, imparts the faculty of supporting themselves for a moment in the air, as with a parachute, and of making very great leaps. The European flying-squirrel (*P.* or *Sciuroptĕrus sibericus*) is a native of the forests in the colder parts of Europe and Asia; the American flying-squirrel (*P. volucella*) lives in troops in the western parts of North America.

Fly-trap, the only species known of a genus of plants (*Dionœa*), nat. order Droseraceæ, also called Venus's fly-trap. See *Dionœa.*

Fly-wheel, a wheel with a heavy rim placed on the revolving shaft of any machinery put in motion by an irregular or intermitting force, for the purpose of rendering the motion equable and regular by means of its momentum. A fly-wheel is also used as an accumulator of force; thus, when a small steam-engine sets in motion a very large fly-wheel, the wheel acts as a reservoir of all the small pressures which have been communicated to it, and having thus concentrated them can apply them all together and at once when some great effect is to be produced.

Fo, the Chinese name of Buddha. See *Buddha.*

Focus, (1) in optics, a point in which any number of rays of light meet after being reflected or refracted by a mirror or a lens.

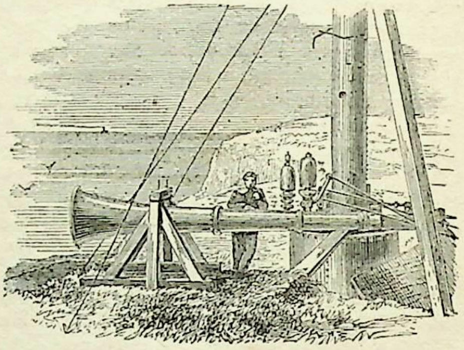
(2) In geom. an important point on the principal axis of the parabola, ellipse, and hyperbola. The ellipse and hyperbola have each two foci, the parabola one, though in the latter case we may suppose a second focus at an infinite distance. The foci were so called from the fact that rays of light proceeding from one focus and reflected from a corresponding reflecting surface pass through the other focus.

Fœtus. See *Fetus.*

Fog, a cloud at or near the surface of the earth, produced by the condensation of the invisible vapour of the atmosphere into minute watery particles, this condensation being caused by a cold current of air, or the contiguity of a cold surface. Fogs are more frequent in those seasons of the year when there is a considerable difference of temperature in the different parts of the day. In low, moist places, and in confined places, as valleys, bays, or lakes, surrounded by high lands, they are much more prevalent than in open countries or elevated spots, where they are quickly dispersed by the winds. The disagreeable pungency of fogs in large towns is due to the presence of smoke and other impurities. Recent experiments would seem to show that there is an intimate connection between fogs and the invisible dust of the atmosphere; that in fact the invisible atmospheric dust is not only necessary to the formation of fogs, but also of clouds and rain.

Foggia (foj'ȧ), a town of S. Italy, province of Foggia, 79 miles N.E. of Naples, with regular and spacious streets. Its principal edifice is a Gothic cathedral. The trade is chiefly in corn, for which immense granaries have been formed under the streets. Pop. 36,852.—The province, which is partly bounded by the Adriatic, has an area of 2954 sq. m. It possesses rich pastures, and produces saffron, wine, &c. Pop. 339,829.

Fog-signals, signals given by means of sound to warn vessels during fogs, when lights or other visible signals cannot be perceived. Various kinds of fog-signals are used, among which may be mentioned bells, drums, gongs, guns, compressed-air whistles, steam-whistles, and fog trumpets or horns. One of the most powerful signals is the siren fog-horn, the sound of which is produced by means of a disk perforated by radial slits made to rotate in front of a fixed disk exactly similar, a long iron trumpet forming part of the apparatus. The disks may each contain say twelve slits, and the moving disk may revolve 2800 times a minute; in each revolution there are of course twelve coincidences between the slits in the two disks; through the openings thus made steam or air at a high pressure is caused to pass, so that there are actually 33,600 puffs of steam or compressed air every minute. This causes a sound of very



Siren Fog-horn.

great power, which the trumpet collects and compresses, and the blast goes out as a sort of sound beam in the direction required. Under favourable circumstances this instrument can be heard from 20 to 30 miles out at sea. Fog-signals are also used on railways during foggy weather; they consist of cases filled with detonating powder, which are laid on the rails and exploded by the engine when it comes up to them.

Föhr (fєur), a Prussian island in the North Sea, off the W. coast of Schleswig; area, 28 sq. m.; pop. about 4000, mostly Frisians engaged in fishing, the capture of wild fowl, and agriculture.

Foil, a thin leaf of metal, as gold or tin, used for various purposes.

Foil, in fencing, a rod of steel, representing a sword, with a handle or hilt at one end, and a leather button at the other to prevent accidents. Foils measure from 31 to 38 inches in length.

Foix (fwȧ), a town of France, capital of dep. Ariège, in a valley at the foot of the Pyrenees, with remains of the old castle of the counts of Foix, and an old church and abbey. Pop. 5860.

Foix, GASTON DE. See *Gaston.*

Fokien, a maritime province of South-eastern China; area, 46,320 sq. m. The strait of Formosa separates it from the island so named. The coast is deeply indented by

bays and studded with islands. The interior is generally mountainous, but is highly cultivated and generally fertile. The principal products are rice, wheat, barley, tea, silk, sugar, indigo, camphor, and tobacco. The capital is Foo-chow. Pop. 25,790,556.

Fokschani (-shä'nē), a town of Roumania, on the Miklov, 104 miles N.E. Bukarest, with an important trade. Pop. 25,290.

Folc-land, that is Folkland, the land of the people, that portion of Anglo-Saxon England which was retained on behalf of the community. It might be occupied in common or possessed in severalty, but could not become allodial estate or absolute private property except with the consent of the Witan or highest council in the land. From time to time large grants were made both to individuals and to communities; and land thus cut off from folc-land was called *boc-land* or 'book-land.' Ultimately the king practically acquired the disposal of it, and the remnant of folc-land became crown lands. See *Feudal System.*

Folc-mote, in Anglo-Saxon England, an assembly of the people to consult respecting public affairs.

Foley, JOHN HENRY, sculptor, born in Dublin 1818, died at Hampstead 1874. He was admitted a student of the Royal Academy in 1835. In 1848 he was elected an associate, and in 1858 an academician. His works are numerous and highly esteemed. They include statues of Selden and Hampden in Westminster; Goldsmith, Burke, and O'Connell in Dublin; Lord Hardinge and Outram for India; Lord Clyde in Glasgow; the group Asia and the colossal statue of Prince Albert for the Albert Memorial, Hyde Park. Foley was buried in St. Paul's Cathedral.

Foliation, in geol. the property or quality in certain rocks of dividing into thin laminæ or plates.

Foligno (fo-lēn'yo), a town of Central Italy, province of Perugia, in a beautiful vale of the Apennines, watered by the Clitumnus. Public buildings worthy of notice are the cathedral and the Palazzo Communale. Pop. 8753.

Folkestone (fōk'ston), a seaport, England, county Kent, 6 miles W. by S. of Dover, terminus of the South-eastern Railway, and a chief station for steamers to and from Boulogne. It is a favourite watering-place, and has a considerable shipping trade. Folkestone is included in the parliamentary borough of Hythe. Pop. 23,905.

Folk-lore, a useful term of recent introduction into the English language, signifying a scientific study of popular tales, traditions, primitive beliefs and superstitions, popular customs, usages, festivals, games, &c. Folk-lore, though it takes cognizance of many apparently trivial matters, is of great importance in the science of comparative mythology, and helps to throw much light on the relationships between races, and on the origin and development of religious beliefs and ceremonies. It is, therefore, of great assistance to the ethnologist, the sociologist, and the historian, as well as to the student of comparative mythology and of the science of religion.

Fomentation, in med. the application of warm liquids to a part of the body, by means of flannels or other cloths dipped in hot water or medicated decoctions, for the purpose of easing pain by relaxing the skin or of discussing tumours.

Fonblanque (fon'blangk), ALBANY WILLIAM, English journalist, born in 1797, died 1872. He was educated for the bar, but, devoting himself to journalism, he gained a position on the Times, the Morning Chronicle, and succeeded Leigh Hunt as editor of the Examiner. A reprint of many of his articles, under the title England under Seven Administrations, appeared in 1837. In 1852 he was appointed chief of the statistical department of the Board of Trade.

Fond du Lac, a city of the United States, Wisconsin, at the mouth of Fond du Lac River, which opens on Lake Winnebago, 148 miles N.N.W. of Chicago. It is the centre of several railways, and has a large trade. The manufactures include iron-founding, carriage and wagon making, tanning, saw-milling, &c. Pop. 12,024.

Fondi, a town of South Italy, near a coast lagoon to which it gives name, prov. Caserta. It is a bishop's see, and contains a cathedral. Fondi stands in a plain, the ancient *Cæcubus Ager*, which produced the famous Cæcuban wine. Pop. 6773.

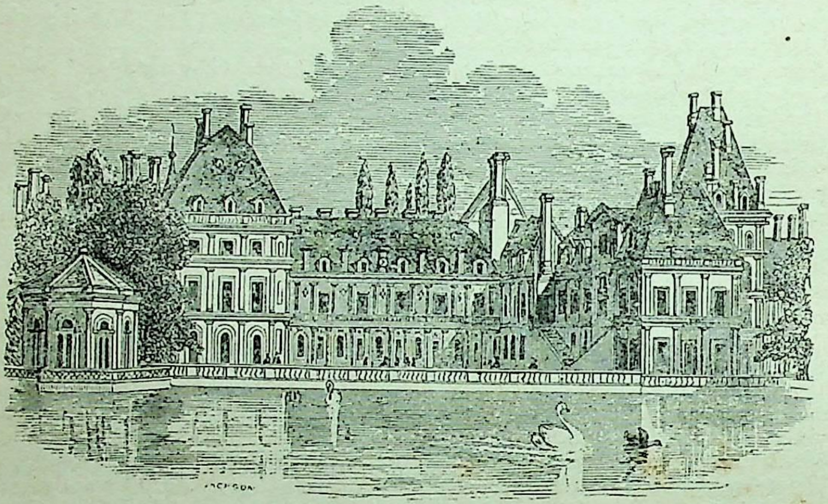
Font, the vessel which contains the water for baptism in a church. It is frequently sculptured in stone or marble, with richly decorative designs.

Fontaine, JEAN DE LA. See *La Fontaine.*

Fontainebleau (fon-tān-blō), a town of France, dep. Seine-et-Marne, in the midst of the forest of same name, about 2 miles from the Seine and 37 miles S.S.E. Paris. It owes its origin chiefly to the palace, and is a quiet place, with broad, clean streets.

Pop. 13,340. The castle or palace of Fontainebleau is one of the most magnificent in France. It occupies the site of a fortified chateau founded by Louis VII. in 1162; this was converted into a magnificent palace by Francis I.; much added to by Henry IV., Napoleon I., Louis Philippe, and Napoleon III. The park is laid out like a vast garden, and adorned with statues, temples, fountains, lakes, and waterfalls. The forest, which is about 50 miles in circumference, covers an area of 42,500 acres, affords numerous pleasant walks, and abounds with game.

Fonta'na, DOMENICO, Italian architect and engineer, born in 1543, died 1607. He was employed by Pope Sixtus V. in many great works, among the chief of which was the erection of the Egyptian obelisk in front of St. Peter's. Among other buildings erected by Fontana, were the Lateran Palace and the library of the Vatican. He also executed important works at Naples.



Palace of Fontainebleau.

Fontana, PROSPERO, Italian painter, born at Bologna 1512, died at Rome 1597. He excelled in design and composition, and adorned several churches in Rome and Bologna with historical frescoes. Among his pupils were his daughter LAVINIA (born 1552, died 1614), who excelled in portraits, and the brothers Caracci.

Fontenay-le-Comte (foṇt-nā-lė-kōṇt), French town, dep. Vendée, 27 miles N.E. of La Rochelle. Has a fine Gothic church with spire 31[illegible] feet high; manufactures coarse linen and woollen cloths, and is an entrepôt for the Gironde and Charente wines. Pop. 9282.

Fontenelle (foṇt-nāl), BERNARD LE BOVIER DE, French author, born at Rouen 1657, died 1757. In 1674 he went to Paris, and soon became known by his poetical effusions and learned works. Before the age of twenty he had assisted in the composition of the operas of Psyche and Bellerophon, which appeared under the name of his uncle, Thomas Corneille. In 1681 he brought out his tragedy Aspar; but it and the other dramas and pastorals with which he opened his literary career were on the whole unsuccessful. In 1683 appeared his Dialogues of the Dead, which were favourably received. His Discourse on the Plurality of Worlds (1686) was the first book in which astronomical subjects were discussed with taste and wit. Among his other works are the History of Oracles and an Essay on the Geometry of the Infinite.

Fontenoy, a village in Belgium, province of Hainaut, celebrated for the battle of May 11, 1745, in which the French under Marshal Saxe defeated the British, Austrian, and Dutch allied forces under the Duke of Cumberland.

Fontevrault (foṇ-tė-vrō), a village of N.W. France, dep. Maine-et-Loire, in a valley 10 miles south-east of Saumur. Here was formerly a rich Benedictine abbey (now a prison) founded in 1099, containing both monks and nuns, and governed by an abbess. The abbey became the head of an order, and

had many dependencies. The old monastic buildings, covering from 40 to 50 acres, are now used as a central prison. In the abbey church are the tombs of Henry II. and of Richard I., kings of England and counts of Anjou, of Eleanor, wife of Henry II., and Elizabeth, wife of John, king of England.

Foo-chow, a town of China, capital of the province of Fokien, on the Min, 125 miles N.E. of Amoy. It consists of the town proper, surrounded by walls, and of extensive suburbs stretching along both sides of the river, and communicating by a stone bridge. Foo-chow is one of the five ports thrown open by the Treaty of 1843. The trade is very extensive, but the navigation of the river from the sea to the harbour is difficult. Foo-chow has a large arsenal and dockyard superintended by European officers; it is also a great literary centre. Pop. estimated at 630,000.

Food. See *Aliment* and *Dietetics.*

Fool. See *Jester.*

Foolah. See *Fellatah.*

Fools, Feast of, the name given to festivals regularly celebrated, from the 5th to the 16th century, in several countries of Europe, by the clergy and laity, with the most absurd ceremonies. The feast of fools was an imitation of the Roman Saturnalia, and, like this, was celebrated in December. The chief celebration fell upon the day of the Innocents, or upon New-year's Day; but the feast continued from Christmas to the last Sunday of Epiphany. The young people, who played the chief parts, chose from among their own number a mock pope, archbishop, bishop, or abbot, and consecrated him, with many ridiculous ceremonies, in the chief church of the place. They often travestied the performance of the highest offices of the church, while others, dressed in different kinds of masks and disguises, engaged in indecent songs and dances, and practised all possible follies in the church. Except from their association with the Saturnalia nothing is known of the origin of these extravagancies, which appear to have been very ancient. They were most common in France, but the feast was also observed in Spain, Germany, England, and Scotland. In France it survived till the year 1644.

Foolscap, paper of the smallest regular size but one (about 13½ by 16½ inches); so called from its water-mark in early times being the outline of a fool's head and cap, for which British paper-makers now substitute the figure of Britannia.

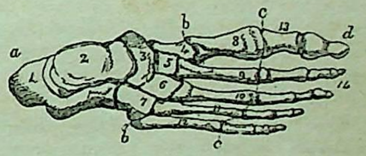
Fool's Parsley, the popular name of *Æthūsa Cynapium*, nat. order Umbelliferæ, a common British weed, growing in cultivated grounds. It is commonly believed to be poisonous, and serious accidents are said to have occurred from its being mistaken for parsley; but if poisonous it is so only in certain localities. Its unilateral reflexed floral leaves distinguish it from most plants to which it is allied.

Foo-shan, a town, China, prov. of Quangtong, 21 miles S.W. of Canton, on one of the branches of the delta of the Si-kiang. Pop. 200,000.

Foot, a measure of length, the name of which is derived from the length of the human foot, containing 12 linear inches.—*Square foot* is a square whose side is one foot, and is therefore equal to 144 square inches.—*Cubic foot* is a cube whose side is 1 foot, and the cube contains 1728 cubic inches. The foot is a common measure in various countries, but its dimensions vary considerably.

Foot, in prosody, a measure consisting of a variety of syllables, two, three, or four, in combinations of long and short, or accented and unaccented. In Greek and Latin verse the feet depend on the *quantity* or length of the syllables, each foot having a distinctive name—trochee, iambus, dactyle, anapest, &c. The same names are applied to English measures, an accented syllable in English being held to be equivalent to a long syllable in Latin or Greek, and an unaccented syllable to a short.

Foot, in animals, the lower extremity of the leg; the part of the leg which treads the



Skeleton of the Human Foot.

a to *b b*, Tarsus. *b b* to *c c*, Metatarsus. *c c* to *d*, Phalanges. 1, Os calcis, calcaneum, or heel-bone. 2, Astragalus. 3, Scaphoid bone, 4, Inner cunoid bone. 5, Middle cunoid bone. 6, Outer cunoid bone. 7, Cuboid bone. 8 to 12, Metatarsal bones. 13, First row of phalanges. 14, Last row of phalanges.

earth in standing or walking, and by which the animal is sustained and enabled to step; or that surface of the body by which progression is effected among the mollusca. The foot of man is composed of twenty-six bones, seven of which constitute the tarsus or ankle, which articulates with the leg and

corresponds to the carpus (wrist). Five bones form the metatarsus, which corresponds to the metacarpus, and articulates with the tarsus behind, and with the toes in front. The foot is narrow and thick in its posterior part, thinner and broader anteriorly; it forms a right angle with the leg, and rests upon the ground at the extremities only. The middle portion is in the form of an arch, and, in consequence, resists shocks and supports pressure much better than it could if it were flat and touched the ground throughout its whole length.

Foota, a territory of Senegambia, W. Africa, on the lower Senegal, which bounds it on the north-east. It includes Foota Toro, and other districts. Area, about 15,000 sq. m.; pop. estimated at 400,000. The natives profess Mohammedanism, and the country is divided into three districts, each governed by its own chief, subject to a sovereign chosen from a few privileged families. It is now under French influence.

Foota-jallon, a region of West Africa, intersected by lat. 11° N. and lon. 11° W. It is extremely mountainous, and is the source of the rivers Senegal, Gambia, and Grande. Large herds and flocks are pastured in the highlands; and the soil produces in abundance oranges and bananas, and palm-trees, which furnish dates, wine, and oil. It is governed by an elective chief under the protection of France.

Foot-and-mouth Disease, a highly contagious eczematous affection which attacks the feet and mouths of cattle, manifesting itself by lameness, indisposition to eat, and general febrile symptoms, with ultimately eruptions of small vesicles on the parts affected, and general indisposition of the animal. The disease occasionally spreads to the udder of milch-cattle, and it is believed that it may be communicated to persons who drink the milk of cows so affected.

Football, an outdoor game of considerable antiquity. In former times towns and villages were often matched against each other, the whole of the able-bodied inhabitants taking part in the struggle; the goals being often miles apart, and usually consisting of natural objects, as a brook or river. The modern form of the game is played by two parties of players, on a large level piece of ground, generally oblong in shape, and having in the middle of either of the ends a goal formed by two upright posts 6 to 8 yards apart, with a bar or tape extended between them at the height of 8 or 10 feet from the ground. There are various styles of playing the game, but the two recognized in all important matches are the Rugby game and the Football Association game. In both games the main object is for either party to drive the ball (which is *kicked off* in the centre of the field) through the goal that their opponents are guarding, and thus count a goal against them. In the Rugby game the goal-posts are 18½ feet apart, and joined by a cross-bar at a height of 10 feet from the ground; and to score a goal the ball must be kicked over this bar by one of the opposite side. In the Association game the upright poles are 8 yards apart, and joined at 8 feet from the ground by a tape, under which the ball must pass to secure a goal. The Rugby game is much rougher and less scientific than the Association game, which discourages rough play and relies mainly on the skilful manœuvring of the ball with the feet, it being forbidden to touch the ball with the hands; while by the Rugby rules the player may catch the ball in his hands, run with it, and kick it dropping. When a goal is made, or at some other arranged interval, the parties change ground for the next struggle, so that any inequalities of situation may be balanced.

Foote, Samuel, English comic writer and actor, born about 1720 at Truro, died at Dover 1777. He was educated at Oxford, and entered the Temple; but after a course of dissipation, to which his small fortune fell a sacrifice, he turned his attention to the stage. He appeared first in Othello, but had little success as a tragedian. In 1747 he opened the theatre in Haymarket, with a dramatic piece which he entitled The Diversions of the Morning. It consisted of some very humorous imitations of well-known characters, in detached scenes, written by Foote, who always took the leading parts himself. After 1752 he performed alternately in London and Dublin. He did not obtain a patent for the Haymarket till 1766. Of his numerous plays, above twenty in number, hardly one is now acted. His humour is described by Dr. Johnson and other witnesses as irresistible.

Foot-guards. See *Guards*.

Foot-lights, in theatres, the row of lights placed on the front of the stage and on a level with it, to light it up.

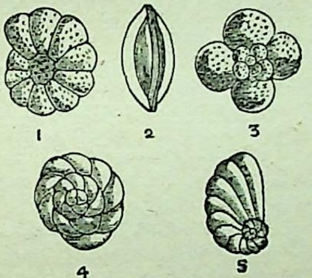
Foot-pound, in physics, the term expressing the unit selected in measuring the work done by a mechanical force. A foot-pound represents 1 lb. weight raised through a

height of 1 foot; and a force equal to a certain number of foot-pounds, fifty for example, is a force capable of raising 50 lbs. through a height of 1 foot.

Foot-rot, a disease in the feet of sheep, the more common form of which is an inordinate growth of hoof, which at the toe, or round the margin, becomes turned down, cracked, or torn, thus affording lodgment for sand and dirt. In the second form of the disease the foot becomes hot, tender, and swollen; there are ulcerations between the toes, followed by the sprouting of proud flesh.

Footstalk—(1) In botany, a petiole; the stalk supporting the leaf, or connecting it with the stem or branch. (2) In zoology, a process resembling the footstalk in botany, as the muscular process by which certain of the Brachiopoda are attached, the stem which bears the body in barnacles, the stalk which supports the eyes in certain crustaceans.

Foraminif'era, an order of animals of low type belonging to the class Rhizopoda, subkingdom Protozoa, furnished with a shell or



Foraminifera (recent).

1, Planorbulina Ugeriana. 2, Triloculina tricarinata. 3, Globigerina bulloides. 4, Rotalia Beccarii. 5, Nonionina turgida.

test, simple or complex, usually perforated by pores (*foramina*), whence the name. The shell may be composed of horny matter, or of carbonate of lime, secreted from the water in which they live. Owing to the resemblance of their convoluted chambered shells to those of the nautilus, they were at first reckoned among the most highly organized molluscs. In reality they are among the simplest of the protozoa. The body of the animal is composed of granular, gelatinous, highly elastic sarcode, which not only fills the shell, but passes through the perforations to the exterior, there giving off long thread-like processes called *pseudopodia* interlacing each other so as to form a net like a spider's web. Internally the sarcode-body exhibits no structure or definite organs of any kind. Foraminifera appear very early in the geological formations. The great formation known as white chalk is largely composed of foraminiferous shells, while another remarkable formation known as Nummulitic Limestone receives its name from the presence of coin-shaped foraminifers, generally about as large as a shilling.

Forbes (for'bes or forbz), DUNCAN, of Culloden, Scottish lawyer and politician, born 1685, died 1747. He studied law at Edinburgh and Leyden; was called to the bar in 1709, and appointed Sheriff of Midlothian. He helped to crush the rebellion of 1715; in 1716 was advocate-depute, in 1722 member of parliament for the Inverness burghs, in 1725 lord-advocate, and in 1737 lord-president of the Court of Session. In 1734, in consequence of the death of his brother, he fell heir to the estate of Culloden. He devoted himself to the improvement of the industry of Scotland, and materially aided in laying the foundations of that commercial prosperity to which his country has since attained. He also effected many improvements in the procedure of the Court of Session. It was mainly owing to his exertions that the rebellion of 1745 was prevented from spreading more rapidly among the clans; but so ungratefully was he treated by the government, that he was never able to obtain repayment of the large sums he had expended to uphold it. He wrote several religious works: Thoughts on Religion; Reflections on the Sources of Incredulity in Regard to Religion; Letter to a Bishop; &c.

Forbes, EDWARD, British naturalist, was born at Douglas, Isle of Man, 1815, died at Edinburgh 1854. He early devoted himself to science, and having made scientific journeys in Norway, Sweden, France, Germany, &c., he was attached to a scientific expedition to the Mediterranean, the result of which appeared in a report presented to the British Association, and in Travels in Lycia. In 1842 he became professor of botany at King's College, London. On the opening of the School of Mines Forbes was appointed lecturer on natural history as applied to geology and the arts. He still retained his professorship of botany at King's College, and continued to contribute annually some of his most valuable memoirs to the British Association, besides writing for scientific and literary journals. In 1853 he

was appointed to the chair of natural history in Edinburgh. Among his more important works, which include a great number of valuable papers on zoological, botanical, and literary subjects, are a History of the Star-fishes and History of British Mollusca.

Forbes (forbz or for'bes), James David, Scottish scientist, born 1809, died 1868. He was educated at Edinburgh University, and admitted to the Scottish bar. In 1833 he was appointed to the chair of natural philosophy in the University of Edinburgh. In 1860 he became principal of the United Colleges of St. Salvador and St. Leonard, in the University of St. Andrews. His fame rests chiefly on his study of glaciers. His chief publications on this subject are: Travels through the Alps of Savoy; Norway and its Glaciers; Tour of Mont Blanc and Monte Rosa; and Occasional Papers on the Theory of Glaciers. Forbes' theory of the glacier was that it was a viscous body, urged down slopes of a certain inclination by the mutual pressure of its parts. See *Glaciers.*

Forbes, Sir John, a Scottish physician, a homœopathist, phrenologist, and believer in mesmerism, born 1787, died 1861. He received his professional education at Aberdeen and Edinburgh, graduating M.D. at the latter in 1817. In 1840 he settled in London, and soon became physician extraordinary to the Prince Consort, and physician to the Queen. In 1853 he was knighted. His first works were his translations of the writings of Avenbrugger and Laennec on auscultation and the use of the stethoscope. To the Cyclopædia of Practical Medicine, of which he was joint-editor, he contributed some of the best articles in the work. He was the founder of the British and Foreign Medical Review, and published a number of professional and other works.

Forbes MacKenzie Act, the popular title of an act for the better regulation of the public-houses of Scotland, passed 15th August, 1853. It was introduced in the House of Commons by Forbes MacKenzie, member for Liverpool, although its author was Lord Kinnaird. See *Licensing Acts.*

Forbidden Fruit, a name fancifully given to the fruits of various trees grown in tropical countries, as the shaddock (*Citrus decumānus*), a sort of thick-skinned orange (*Citrus paradīsi*), and the poisonous fruit of the *Tabernæmontāna dichotŏma*, a tree of Ceylon, traditionally said to be the fruit of which Adam and Eve ate at the time of the fall in Eden.

Force, that which is the source of all active phenomena occurring in the material world, and of which motion, gravitation, heat, light, electricity and magnetism, cohesion, and chemical affinity are believed to be exhibitions. Mechanical force is the power which produces or modifies motion or tends to do so. It has its origin in three causes: (1) gravitation; (2) the unknown cause of the phenomena of light, heat, and electricity; and (3) life. Mechanical forces are of two sorts: one of a body at rest, being the same as pressure or tension; the other of a body in motion, being the same as impetus or momentum. When two forces act on a body in the same *line of direction* the resulting force, or *resultant* as it is called, will be the sum of both forces. If they act in opposite directions the body will remain at rest if the forces be equal; or, if the forces be unequal, it will move with a force equivalent to their difference in the direction of the greater. If the lines of direction make an angle with each other the resultant will be a mean force in an intermediate direction. The *composition of forces* is the combining of two or more into one (actually or hypothetically), which shall have the same effect when acting in some given direction; the *resolution of forces* is the decomposing of a single force into two or more forces, which, acting in different directions, shall be equivalent to the single force. Forces have different denominations according to their nature and the manner in which they act: thus we have accelerating forces, constant forces, parallel forces, uniform and variable forces, &c. The *unit of force* is a single force in terms of which the amount of any other force is ascertained. See *Dynamics, Energy.*

Forcellini (for-chel-ē'nē), Egidio, an Italian lexicographer, born 1688, died 1768. The poverty of his parents deprived him of early advantages, and he was almost grown up when he began to study Latin in the seminary at Padua. Forcellini made rapid progress in Latin and Greek, and assisted his teacher Facciolati in his new and greatly augmented edition of Calepin's dictionary of seven languages. The two friends then resolved to publish a complete Latin dictionary. The execution of this great work, occupying nearly forty years of his life, devolved entirely upon Forcellini, though he had the counsel and supervision of his old teacher. It was published under the title Ægidii Forcellini totius Latinitatis Lexicon, &c. (Padua, 1771, four vols. folio).

For'ceps, a general name for a two-bladed instrument on the principle of pincers or tongs, used for seizing and holding, and for extracting objects, which it would be impracticable thus to treat with the fingers. Such instruments are used by watchmakers and jewellers in delicate operations, by dentists in forcibly extracting teeth, for grasping and holding parts in dissection, for extracting anything from a wound, taking up an artery, and by accoucheurs.

Force-pump. See *Pump.*

Forcible Detainer, in English law, a violent withholding of the lands, &c., of another from his possession.

Forcible Entry, in English law, the violently taking possession of lands or tenements.

Forcing, a method of cultivation by which plants, flowers, and fruits are raised at an earlier season than the natural one by protecting them under glass, in hot or cold frames, by using stimulating fertilizers, and other means.

Ford, JOHN, an early English dramatic author, born in 1586, died about 1640. He entered the Middle Temple in 1602, and appears to have practised as a lawyer. In 1606 he published a monody on Charles Blount, Lord Mountjoy, afterwards Earl of Devonshire. His dramas are: The Lover's Melancholy (1629); 'Tis a Pity she's a Whore (1633); The Broken Heart (1633); Perkin Warbeck (1634); The Fancies Chaste and Noble (1638); The Lady's Trial (1639); The Sun's Darling (1657), and several others written in conjunction with Dekker, Webster, and others.

For'dun, JOHN, the father of Scottish history, born probably at Fordoun, Kincardineshire, soon after 1300; died about 1386. He wrote the first five books of his history known as the Scotichronicon (in Latin), bringing it down to 1153, and part of the sixth, and left materials for its continuation down to his own period. It was resumed about 1441 by Walter Bower, abbot of the monastery of Inchcolm, by whom the five books of Fordun were enlarged, and eleven new ones added, bringing the history down to 1437. It exists in numerous MS. copies, and several printed editions have been published, the best of which is that of W. F. Skene, Edinburgh, 1871–72, with translation.

Fore-and-aft, in ships, a term meaning in a line with the keel. *Fore-and-aft* sails are those that are set on a stay or gaff and boom, such as jibs, stay-sails, &c.

Forecastle, a short deck in the forepart of a ship of war, or forward of the foremast, above the upper deck. In merchant ships it is the forepart of the vessel, where the sailors live.

Foreclosure, in English law, is the right of a mortgagee, or of anyone having interest in a mortgage, in the event of the conditions of the mortgage being violated, to compel the mortgager to redeem the pledge or forfeit his right of redemption.

Foreign Attachment. See *Attachment.*

Foreign Bill of Exchange. See *Bill.*

Foreign Enlistment. See *Enlistment.*

Foreign Office, that department of the British government presided over by the secretary of state for foreign affairs, and having its locale in Downing Street, Westminster. It was established in 1782, and has charge of British interests in foreign countries. The secretary for foreign affairs negotiates treaties, appoints diplomatic officers, &c.

Foreland, a cape or promontory projecting into the sea, as the North and South Forelands, two headlands in England on the coast of Kent. The former on the N.E. coast, 2½ miles S.E. of Margate, has a lighthouse 85 feet high, showing an intermittent light. The latter on the S.E. coast, 3 miles N.E. of Dover, has two lighthouses with fixed lights, 372 and 275 feet above high water.

Foren'sic Medicine, the branch of medical education which applies the principles and practice of the different branches of medicine to the elucidation of doubtful questions in a court of justice; otherwise called medical jurisprudence.



Foreshortened (after figure by Raphael).

Foreshortening, in drawing and painting, the art of representing figures in such a

manner as to convey to the mind the impression of the entire length of any object which is pointing more or less directly towards the spectator standing in front of the picture. The projecting object is shortened in proportion to its approach to the perpendicular to the plane of the picture, and in consequence appears of a just length.

Forest, a term properly applied to an extensive wood, or to a large tract of mingled woodland and open and uncultivated land; but also given to a large tract of hilly or mountain land wholly or chiefly devoted to the purposes of the chase. (See *Deer-forest.*) Forests proper are of much importance in the general economy of the globe. They greatly affect climate; and their beneficial influence in a physical, economical, and hygienic aspect is now receiving increased attention. In Germany and various other European countries forest science constitutes a separate branch of education, but in Britain less regard is paid to it. A school has been established at Cooper's Hill, near London, for candidates in the Indian Forest Department, and efforts are being made to establish a school for the United Kingdom. The management of natural or planted woodlands is called *Forestry* or *Sylviculture,* and that of ornamental plantations, avenues, and the like, *Arboriculture.*

In English law, a forest signified a certain territory, whether wooded or not, privileged for game, generally belonging to the sovereign and set apart for his recreation, under special laws, and having officers of its own to look after it. It was defined as containing eight things: soil, covert, laws, courts, judges, officers, game, bounds. It comprised both 'vert'—trees, underwood, and turf; and 'venison'—the hart, the hind, the hare, the boar, the wolf, which were beasts of forest; the buck, doe, fox, marten, which were beasts of chase; the rabbit, pheasant, partridge, quail, mallard, heron, &c., which were beasts and fowls of warren. The forest laws at one time were very oppressive. There are still several royal forests not disafforested, as Windsor Forest and the New Forest.

Forestalling. See *Engrossing.*

Forest-fly, the popular name of a family (Hippoboscidæ) of two-winged flies, parasitic on birds and quadrupeds.

Forest Marble, in geology, an argillaceous laminated shelly limestone, alternating with clays and calcareous sandstones, and forming one of the upper portions of the Lower Oolite: so called from Whichwood *Forest,* in Oxfordshire, where the finer bands are quarried as marble.

Forest-oak, the commercial term for the timber of trees of the genus *Casuarina,* belonging to Australia. Called also She-oak, Swamp-oak, and Beef-wood.

For'far, or ANGUS, a maritime county on the east coast of Scotland, bounded N. by counties Aberdeen and Kincardine, W. by Perth, S. by the Firth of Tay, and E. by the German Ocean; area, 568,750 acres. The surface is covered in the west and northwest by a portion of the Grampians known by the name of the Braes of Angus, and in the south by part of the Sidlaw Hills. Between the Grampians and the Sidlaw Hills lies part of the valley of Strathmore, and between the Sidlaw Hills and the Tay is the level but rich and highly cultivated tract of which the Carse of Gowrie forms a part. The chief rivers are the N. Esk and the S. Esk. All the operations of agriculture are carried on in the most approved manner, and nearly half the area is under crops. Cattle rearing is carried to great perfection, the chief breeds being shorthorns and polled Angus. The staple manufacture is coarse linens, which is more or less carried on in all the towns and villages, but has its central locality at Dundee. Sandstone flags are largely quarried in the Arbroath district. The county returns one member to parliament. Pop. 277,773.—The county town, FORFAR, is a royal burgh, 13 miles north by east of Dundee. The public buildings include, besides churches and schools, a town-house, county buildings, public hall, &c. The staple manufacture is linen, especially of the coarser varieties, there being several large factories in the town, in connection with which are several bleach-works. Forfar belongs to the Montrose district of burghs, which sends one member to parliament. Pop. 12,057.

For'feiture, a punishment annexed to some illegal act or remissness of an owner or tenant of property, whereby he loses his interest therein, together with his title, the same going to the party injured by such act or remissness.

Forge, a workshop or other establishment in which iron or other metal is hammered and shaped by the aid of heat; also, the works where iron is rendered malleable by puddling and shingling. For military purposes a travelling forge is used by forces in the field.

Forgery, at common law, the fraudulent making or alteration of a writing to the prejudice of another man's rights, or making, *malo animo*, of any written instrument for the purpose of fraud and deceit; the word *making*, in this last definition, being considered as including every alteration of or addition to a true instrument. The punishment of forgery at common law is, as for a misdemeanour, by fine, imprisonment, and such other corporeal punishment as the court in its discretion shall award. The punishments ordained for the offence by the statute law in England were once, with scarcely an exception, capital. Capital punishment for forgery was abolished by acts of 1832 and 1861. The punishment now varies from penal servitude for life, or not less than five years, to imprisonment for not more than two years.

Forget-me-not, the name of *Myosōtis palustris*, nat. order Boraginaceæ, a common British plant growing generally in damp or wet places. Scorpion-grass is also a name for it and others of its genus. It is a very beautiful plant, and considered to be the emblem of friendship in almost every part of Europe. Its flowers are bright blue with a yellow eye. Forget-me-nots also grow in the U. States. The dark-blue forget-me-not of the Azores (*M. azorica*) is now cultivated in greenhouses, and is much esteemed for the brilliancy of its flowers.

Forli', a town of North Italy, capital of a province of same name, 38 miles south-east of Bologna. It is handsome and well built, has manufactures of silk ribbons, silk twist, woollen stuffs, &c., and a considerable trade. Forli has a cathedral and is a bishop's see. Pop. 16,016.—The province of Forli is bounded on the east by the Adriatic; area 716 sq. miles; pop. 254,734.

Forlorn Hope, a body of men, usually volunteers, selected from different regiments, to lead an assault, enter a breach, or perform other service attended with uncommon peril. The term is of Dutch origin; *hope* being from Dutch *hoop*, a company.

Form, as a metaphysical term, has been defined as the essence of the thing from which result not only its figure and shape, but all its other qualities. Hence it is all that makes a thing intelligible to the mind, in contradistinction to *matter*, thus regarded as a kind of unknown substance or substratum.

Forma Pauperis, In, 'in the form or character of a poor person (pauper).' By the laws both of England and Scotland provision is made for suits being carried on by individuals who are too poor to pay the usual fees. A suit conducted under these provisions is said to be a suit *in forma pauperis*. In England it is provided that any one having a good cause of action, and taking oath that he is not worth £5 beyond his wearing apparel and the subject in dispute, is entitled to have writs without paying fees, and the judges may assign him counsel and attorney, who shall act gratuitously. In Scotland similar provision is made for the poor, advocates and solicitors being annually appointed for the conduct of poors' cases before the supreme and sheriff courts.

Formation, in geology, any series of rocks referred to a common origin or period, whether they consist of the same or different materials. Geological strata are divided into certain groups of one era of deposition, sometimes of very dissimilar mineralogical character, but inclosing the same fossil species; as, the Carboniferous, Oolitic, Cretaceous, Silurian, Laurentian, &c., *formations*. See *Geology*.

Formente'ra, one of the Balearic Islands, about 12 miles long and 8 broad, hilly, woody, and but little cultivated.

Formi'ca, the genus to which some of the ants belong.

Formic Acid (CH_2O_2), an acid obtained from ants (L. *formica*, an ant), when repeated quantities of them have been infused in boiling water. It is contained in human sweat and urine, in the common nettle and other plants, and may be prepared artificially in various ways. It is a colourless volatile liquid, with pungent odour, and producing intense irritation on the skin.

Formo'sa, an island in the Chinese Sea, separated from the Chinese prov. of Fokien by a strait about 80 miles wide where narrowest. The island is about 250 miles in length and 70 in average breadth. It is divided by a central range of mountains (rising to 12,000 feet) into a western and eastern part, the former of which (mostly a plain) is occupied by large numbers of immigrant Chinese, and highly cultivated, producing in abundance corn, rice, sugar, pepper, camphor, oranges, bananas, &c. The eastern part is inhabited mainly by wild tribes of Malayan race, who are gradually disappearing before the Chinese. Northern Formosa is volcanic, and earthquakes occur. Four ports have been opened since 1860 to European commerce: Tai-nan (the capital),

Tam-sui, Ke-lung, and Takow; and the trade of the island since then has greatly increased. The chief exports are coal, tea, camphor, sugar, indigo, timber; the imports are cottons, woollens, opium, &c. Formosa now belongs to Japan. Pop. 3,000,000.

Formo'sa, an island in the Atlantic, forming one of the Bissagos off the west coast of Africa. See *Bissagos.*

For'mula, a fixed form of words or symbols. In theology it is a formal statement of doctrines; in mathematics, a general theorem, a rule or principle expressed in algebraic symbols. In chemistry it is a mode of expressing the constituents of a compound by means of symbols and letters. Thus water is represented by H_2O, in which H_2 stands for the two proportions of hydrogen and O for the one of oxygen which are combined to produce water.

Forres (for'es), a royal and parliamentary burgh of Scotland, county of Elgin, beautifully situated in a finely-wooded country. Forres Castle was the residence of the early Scottish kings, and Shakspere has made this neighbourhood the scene of the chief events in Macbeth. Forres is one of the Inverness district of parliamentary burghs. Pop. 3971.

Forrest, EDWIN, an American actor, born in Philadelphia 1806. He showed an early talent for the stage, and in 1820 made his début at Philadelphia as the hero in Home's play of Douglas. In 1826 he appeared before the New York public as Othello with signal success. In 1835 he visited England, making a third and last visit in 1844. He continued to act with great success at New York till 1871, when he retired, dying in 1872. His chief characters were Othello, Macbeth, Hamlet, and Richard III.

Forster, JOHANN GEORG ADAM, German traveller, son of Johann Reinhold Forster (see next art.), was born in 1754. He accompanied his father to Russia and England, and both accompanied Cook in his voyage round the world 1772–75. Subsequently he taught natural history at Cassel, held a professorial chair at Wilna, became librarian to the Elector of Mains, and died at Paris in 1794. An excellent account of Cook's second voyage round the world was written by him in connection with his father. He also wrote Essays on Geography, Natural History, Views of the Lower Rhine, &c.

Forster, JOHANN REINHOLD, German writer, father of the foregoing, born in 1729. He studied theology at Halle, and became preacher at Nassenhuben. He chiefly devoted himself, however, to his favourite studies—mathematics, history, geography, &c. After having been engaged on a mission by the Russian government he in 1766 migrated to London, where he supported himself, and his son Johann Georg partly by teaching. He was finally invited to accompany Captain Cook in his second voyage as naturalist of the expedition. An account of the voyage was published in his son's name (London, 1777). In 1780 he was invited to Halle as professor of natural history, and continued there until his death in 1798.

Forster, JOHN, English writer, born at Newcastle April 2, 1812. While studying for the bar in London he contributed to the Examiner and other periodicals. In 1843 he was called to the bar, but his main interests remained in the field of literature. He became editor of the Daily News in 1846, and shortly afterwards of the Examiner. In 1848 he published his Life of Goldsmith. In 1856 he retired from the editorship of the Examiner, having been appointed the year previous secretary to the Lunacy Commission, of which he became in 1861 a commissioner. During this period he devoted himself to historical studies, the result of which appeared in his Arrest of the Five Members, Debates on the Grand Remonstrance, and Life of Sir John Eliot. He also published biographies of Landor and Dickens, but died 1st Feb. 1876, before completing his Life of Swift.

Forster, THE RIGHT HON. WILLIAM EDWARD, English statesman, born at Bradpole, Dorset, July 11, 1818, the son of an eminent minister of the Society of Friends. He entered into the woollen trade at Bradford. In 1850 he married the eldest daughter of Dr. Arnold of Rugby. He was returned to parliament for Bradford in 1861; became successively under-secretary for the colonies (1865), vice-president of the Education Committee (1868), and a member of cabinet (1870). He had charge of the Education Bill of 1870 and the Ballot Bill of 1872. In 1880. the Liberals having just returned to power, Mr. Forster accepted the post of chief secretary for Ireland at a time when that country was distracted by agrarian and political tumults. The suppression of the Land League and the arrest of Mr. Parnell and the more violent agitators was carried out by Mr. Forster, but on the government resolving to change its policy and release

the Parnellites Mr. Forster resigned (1882). After this he was often found voting in opposition to the government, particularly in matters of foreign and imperial policy. He died April 6, 1886.

Forsyth (for-sith′), William, English lawyer and writer, born 1812. After a brilliant career at Trinity College, Cambridge, he studied law, was called to the bar in 1839, and became a queen's counsel in 1859. He represented the borough of Marylebone in the House of Commons in 1874–80. Besides legal works he has written Hortensius, or the Duty and Office of an Advocate; History of Trial by Jury; Napoleon at St. Helena and Sir Hudson Lowe; Life of Cicero; Novels and Novelists of the 18th Century; Hannibal in Italy, a drama, &c.; and has contributed to various periodicals.

Fort, a small fortified place surrounded with a ditch, rampart, and parapet, for the purpose of defending a pass, river, road, harbour, &c. Forts are made of different forms and extent according to the exigencies of the case. See *Fortification*.

Fort Augustus, a village of Scotland, county of Inverness, on the Caledonian Canal, about 33 miles s.w. of Inverness. It has its name from a fort erected in the vicinity in 1734 to overawe the Highlanders, who, however, succeeded in capturing it in 1745. It was occupied by a garrison till 1857, was purchased by Lord Lovat in 1876, and now forms the site of a Roman Catholic abbey and college. Pop. 611.

Fort de France, or Fort-Royal, a town and seaport, French West Indies, island of Martinique, of which it is the capital. It has a fine harbour and strong fortifications. Pop. 11,424.

Fort George, a fortress of Scotland, in the county of and 10 miles north-east of Inverness, at the extremity of a low point of land projecting into the Moray Firth. It was built after the rebellion of 1745, and can accommodate about 2000 men.

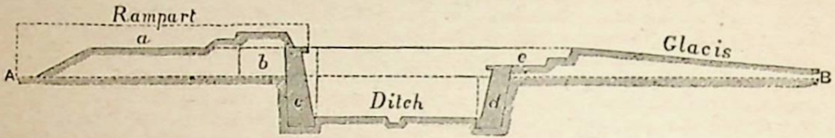
Forth, a river of Central Scotland, formed in Perthshire by the junction of two streams, the Duchray and the Dhu, about 1 mile w. of Aberfoyle. From Aberfoyle the river flows south-east, forming for a considerable part of its course the boundary between the counties of Stirling and Perth, winding in its lower course in a series of curves known as the *Links of Forth*, and expanding thereafter into the *Firth of Forth*, which forms the most important harbour of refuge n. of the Humber. Its chief ports are Leith, Granton, Bo'ness, and Grangemouth. The Forth is navigable for the smaller class of vessels as far up as Alloa. Its length is about 170 miles. It is a good salmon stream. There are several islands in the estuary, on two of which, the Isle of May and Inchkeith, lighthouses are erected. The firth is crossed at Queensferry by a bridge. See *Forth Bridge*.

Forth and Clyde Canal, a canal in Scotland constructed in 1768–90, and extending from the Forth at Grangemouth to the Clyde at Bowling, thus giving communication by water from the east to the west coast. It is 35 miles long. The Union Canal, 31½ miles long, joins it near Falkirk and connects it with Edinburgh.

Forth Bridge, the great railway viaduct which crosses the Firth of Forth at Queensferry, here about 4000 feet wide at low water. The small island of Inchgarvie is used as the central support of the two chief spans, which are 1710 feet wide each. These spans are each made up of two cantilevers extending towards each other from the opposite sides and connected by a girder, the cantilevers being 343 feet deep where they rest on the supporting piers and 40 feet at the free ends, and projecting 680 feet, while the central connecting girder is 350 feet in length. There are other two spans of 680 feet each, fifteen of 168 feet each, and seven small arches totalling about 400 feet. Including piers there is about a mile of main spans and over half a mile of viaduct approach. The clear headway under the centre of the bridge is 150 feet above high water, while the highest part of the bridge is 361 feet above high water. Each of the main piers consists of a group of four cylindrical granite and concrete piers 49 feet in diameter at the top and from 60 to 70 feet at bottom. The deepest pier is about 70 feet below low water, and the rise of the tide is 18 feet at ordinary springs. In the piers there are about 120,000 cubic yards of masonry, and in the superstructure about 45,000 tons of steel. All the foundations are either on rock or on a boulder-clay which for all practical purposes is as hard as rock; and the whole structure presents a net-work of bracing capable of resisting stresses in any direction and of any probable severity. The bridge carries two lines of rails. It was projected by a company in which the North British, Great Northern, North Eastern, and Midland Railways are interested. The engineers were Sir John

Fowler and Sir B. Baker, C.E., and the contract price was £1,600,000. Operations were commenced in January, 1883, and the work was completed in the end of 1889.

Fortification, the science of strengthening positions in such a way that they may be defended by a body of men much inferior in number to those by whom they are attacked; and more particularly, the science of strengthening positions so as that they may be held against the assault of troops supported by artillery. Fortifications are usually divided into permanent and temporary. Permanent fortifications are works required to remain effective for any length of time, for the purpose of defending important positions and cities, dockyards, arsenals, &c. Temporary fortifications are such as are designed merely to throw temporary obstacles in the way of the enemy, as field-works, &c. The former are constructed on the principle that each part must by its fire support and be supported by some other part; that the works must protect the defenders from the enemy's fire as well as possible, and that the fire of the fortress must completely sweep all parts of the ground in front of the fortified lines. The more important details of a regular fortification may be briefly described as under: Around the place to be defended is raised a mound or bank of earth called a rampart, on the upper surface of



Section through line of Fortifications.

which, the *terre-pleine* (*a*), the troops and cannon are placed. The terre-pleine is protected from the enemy's fire by a breastwork or *parapet* (*b*), about 8 feet high, sometimes pierced at certain intervals with *embrasures* through which the guns are fired. Beyond the rampart is the *ditch*, usually about 12 feet in depth, but varying greatly in width. The ditch is sometimes filled with water; in other cases it is dry. The *scarp* or *escarp* (*c*) is the inner wall of the ditch, and it is faced with mason-work or hurdles, sods, &c. (the *revetement*) to retain the earth of the rampart in its place. The *counterscarp* (*d*) is the opposite or outer wall of the ditch. From the top of the counterscarp outwards is a space about 30 feet wide (the *covered-way*, *e*) protected by a parapet, the long superior outward slope of which towards the open ground forms the *glacis*. The use of the covered-way is to allow the troops to be drawn up on it unseen by the besiegers for the purpose of making a sortie; it also enables the defenders to keep up a closer fire on the attacking forces. The slope of the glacis is so constructed as to bring the assailants in the direct line of fire from the artillery on the ramparts. In the sectional cut A is towards the interior of the fort, B towards the open country. At certain intervals there are often bastions or projecting works at salient angles, commanding by their fire the *curtain* or straight portion of the fortified line between them. The use of the bastion has given name to what is called the *bastionary* system of fortification, which has in modern times largely given way to what is known as the *polygonal* or German system, which is considered to have various advantages in relation to the powerful artillery of the present day. The polygonal system has also been called the *caponier* system, from the use of powerful casemated caponiers constructed across the ditches and serving instead of bastions for their defence. The general plan of the works is polygonal, with the ramparts placed on the sides of the polygon. The connecting line of fortifications surrounding a place is called the fortified *enceinte*, and the works in a regular fortress form a very complicated whole, including works to which such names as *ravelins*, *demi-lunes*, &c., are given. The fortified enceinte immediately surrounding a place is not now considered a sufficient defence, on account mainly of the long range of modern cannon. Hence it is usual to surround a fortress with a line of detached forts at some distance from the enceinte, or there may be more than one such line of advanced works. Fortifications intended to ward off attacks by sea have their sea-faces now commonly protected by plates of

iron or steel. Scientific fortification may be said to commence with the great French engineer Vauban, who served under Louis XIV. He developed the bastioned system, which, as improved by Cormontaigne and others, is still the prevailing type of French fortification.

Field Fortifications vary much according to the time allowed for construction, and during which they may prove useful. Among works of this nature are the *redan*, which consists of two parapets, with a ditch in front, forming an angle facing the enemy; the *lunette*, which is a redan with short flanks; the *redoubt*, a closed work with a ditch and parapet all round. As none of those works has a flanking fire in itself, they have to be disposed so that they flank each other within rifle range. To do this effectually, and to strengthen the whole line, the plan generally adopted is to form an intrenched camp by a line of square redoubts, flanking each other, and also a line of simple redans in front of the intervals of the redoubts. When the time is not sufficient to throw up such works, simple forms of intrenchment, such as shelter trenches, are used to shelter troops or oppose the enemy's advance. A very shallow trench, with the earth thrown to the front, so as to afford shelter to one man lying in it, may be made in somewhat less than half an hour; more elaborate forms in about one hour. So that by placing a man at every 4 feet, active troops can make good shelter for themselves in an hour. To impede the enemy's advance an abattis of felled trees may be used, also wire entanglements, chevaux-de-frise, &c.

Fortis'simo (Ital.), in music, a direction to sing with the utmost strength or loudness.

Fortnightly Review, an English magazine so named from its having at first been published every two weeks, founded in 1865 under the editorship of G. H. Lewes. It has long appeared monthly. It was designed as a vehicle for philosophical Radicalism, but has since opened its columns to all schools of political thought.

Fortress. See *Fortification.*

Fortrose', a seaport, royal and parliamentary burgh of Scotland, in Ross-shire, uniting with Inverness, Nairn, and Forres in returning a member to the House of Commons. Pop. 869.

Fort-Royal. See *Fort de France.*

Fort Sumter, a fort on the entrance to Charleston Harbour, South Carolina, U.S. At the opening of the War of Secession it was taken by the Confederates from the small body of U.S. troops by whom it was garrisoned (13 April, 1861). It repulsed an attack of nine iron-clads on 7 April, 1863, and was heavily bombarded in August of the same year, but maintained its defence till the final evacuation of Charleston, Feb. 18, 1865. It has been rebuilt on a modified plan.

Fortu'na, the Roman goddess of success, corresponding to the Greek *Tychē*. She is generally delineated with a rudder, emblem of her guiding power; or, later, with a bandage over her eyes and a sceptre in her hand, and sitting or standing on a wheel or globe.

Fortunate Islands, an old name of the Canaries.

Fortuna'tus, the hero of an old popular legend. He obtained a wishing-cap and inexhaustible purse of gold, which finally ruined him and his sons. The first printed edition of the story appeared in Germany in 1509, but in various forms it has appeared in most of the languages of Europe.

Fortunatus, a Latin poet, born in Northern Italy about 503 A.D.; Bishop of Poitiers in 597; died about 600. His works were numerous, but he is remembered only by his hymns, one of which (*Vexilla regis prodeunt*) was adopted by the church, and is well known in the modern version of J. M. Neale ('The royal banners forward go,' &c.).

Fortune-tellers, persons professing or pretending to tell fortunes; punishable in Britain as rogues and vagabonds.

Fortu'ny, Mariano, a Spanish painter, born near Barcelona, 11th June, 1839. He studied at Madrid, travelled in Morocco, and settled at Rome, where he became the centre of a school of artists in revolt against over-study of the 'masters.' In 1866 he went to Paris, where his pictures, mostly genre subjects from southern and oriental life, had a great success. Amongst the best known are A Spanish Marriage, A Fantasia at Morocco, The Academicians at Arcadia, The Seashore at Portici. He died in 1874.

Fort Wayne, a flourishing city of Indiana, United States, situated in a beautiful and well-cultivated country at the junction of the St. Mary's and St. Joseph's rivers, which here unite to form the Maumee. It has railroad and machine works, and derives its name from a fort erected here in 1794 by General Wayne. It is the seat of a Roman Catholic episcopal see. Pop. 35,393.

Fort William, a town of Scotland, county of Inverness, at the foot of Ben Nevis, near the south end of the Caledonian Canal. It is named from a fort built here by General Monk, and rebuilt by General Mackay (1689), but now occupied as private dwelling-houses. Pop. 1870.

Forum, among the Romans, any open place where the markets and courts of justice were held. There were a number of such places in Rome, by far the most celebrated being the great Roman forum (*Forum Romānum*) between Mount Palatine and the Capitoline Hill. This place, once adorned with the most beautiful statues and buildings, had become almost a waste known as the *Campo Vaccino*, or cattle-field, but of late years the government have made clearances and excavations and taken charge of the valuable relics which are still left.—In legal phrase *forum* signifies the court or place where an action is instituted.

Fos'cari, Francesco, Doge of Venice, born about 1372, elected in 1423. The whole period in which he governed the republic was one of war and tumult, campaigns being undertaken against the Turks, the Visconte of Milan, and others, in which Venice was mostly victorious, extending her dominion to the Adda. But in his private life the doge was less fortunate. Three of his sons died in the service of the republic, and the fourth, Jacopo, being accused of receiving bribes from foreign princes, was condemned to torture and exiled to Crete, where he died. When eighty-five years of age Foscari was deposed from the dogeship at the instigation of a rival, Jacopo Loredano, and died a few days after, November 1, 1457. On the story of Jacopo Foscari is founded Byron's tragedy of The Two Foscari.

Fos'colo, Ugo, an Italian poet and prose writer, born about 1776, and educated at the University of Padua. Before the age of twenty he produced his tragedy Il Tieste (Thyestes), which was received with applause. His next work of importance was a romance somewhat in the style of Goethe's Werther, called Ultime Lettere di Jacopo Ortis (Last Letters of Jacopo Ortis). He then procured a commission in the army (First Italian Legion). After some military experiences under Masséna at Genoa and elsewhere, in 1805 he retired and wrote I Sepolcri, one of the finest of his poems. He was subsequently appointed to a professorship at Pavia, of which Napoleon, displeased at his freedom of speech, soon deprived him. In 1812 he produced his tragedy of Ajax, and soon after that of Ricciarda. On the fall of Napoleon, Foscolo, who was obnoxious to the Austrians, retired to Switzerland; but finally, in 1815, went to London, where he met with a most favourable reception, and where he died Sept. 10, 1827. Besides the works already mentioned, his critical writings, Essays on Petrarch and Discourses on the texts of Dante and of Machiavelli's Il Principe, are well known.

Foss, or Fosse (French *fosse*, Latin *fossa*, a ditch), in fortification, a trench or ditch, often full of water, below the rampart of a fortified place, or a post that is to be defended. See *Fortification*.

Fossa'no, a town in North Italy, on the Stura, 13 miles north-east of Cuneo. It is surrounded by old walls and defended by a castle. It is a bishop's see and has a cathedral. Pop. 7959.

Fosse Way, or Fosse Road, one of the great Roman roads from Cornwall by Bath, Coventry, and Leicester, to Lincoln. It is still traceable nearly all the way.

Fossil, a term for the petrified forms of plants and animals which occur in the strata that compose the surface of our globe. Most of these fossil species, many of the genera, and some of the families, are extinct. When these remains are only partially fossilized, and occur in superficial or recent deposits, the term *sub-fossil* is employed. See *Geology* and *Palæontology*.

Fossombro'ne, a town of Central Italy, 38 miles W.N.W. of Ancona, on the Metauro, with a fine cathedral. Pop. 4266.

Foster, Birket, an English artist, born at North Shields in 1825. He learned wood-engraving under Landells, and in early life became a draughtsman. He soon achieved a high reputation as book illustrator, and illustrated the works of Goldsmith, Scott, Longfellow, Beattie, &c. His landscape drawings on wood are of great excellence. He afterwards devoted himself to water-colour painting, in which his reproductions of rustic life were very successful. Died 1899.

Foster, John, English essayist, was born in Yorkshire on 17th September, 1770. After a short trial of the weaving trade he studied for the Baptist ministry, obtained a charge at Newcastle-on-Tyne, but his preaching being unsuccessful, he took to literature, contributing extensively to the Eclectic Review. In 1805 he published four essays, very celebrated in their time,

which established his fame as an author. Their titles are: On a Man's writing a Memoir of Himself; On the Application of the Epithet Romantic; On Decision of Character; and On Some of the Causes by which Evangelical Religion has been rendered Unacceptable to Persons of Cultivated Taste. In 1819 the celebrated Essay on the Evils of Popular Ignorance appeared. He died on 15th October, 1843.

Fotheringhay, a village of England 27 miles north-east of Northampton. In its castle Mary Queen of Scots was beheaded in 1587.

Foucault (fö-kō), JEAN BERNARD LÉON, a French physicist, born 1819, died 1868. His name is especially connected with a celebrated pendulum experiment employed as a method of showing the rotation of the earth on its axis, by observing a vibrating pendulum. He also rendered services to optics, electric lighting, photography, &c.

Fouché (fö-shā), JOSEPH, Duke of Otranto, a minister of Napoleon I., was born in 1763. He was at first educated for the clergy, but having adopted the principles of the revolution he became an advocate and was elected a member of the National Convention in 1792. Here he voted for the death of the king, and was implicated, at least nominally, in the atrocities of the period. On the fall of Robespierre (1794), Fouché, who had for some time tended towards the moderate party, managed to make friends with Barras, and was rewarded for his betrayal by the ambassadorship to Milan. He was afterwards appointed ambassador to Holland, but ultimately recalled to Paris and made minister of police. Here his peculiar talents had full scope; and although he was twice dismissed by Napoleon, who did not altogether trust him, he always recovered his post, was loaded with riches, and made Duke of Otranto. He was minister of police at Napoleon's final abdication and played an important part in the arrangements. He remained in office under Louis XVIII. for a time, but the dislike of the royalist party at length forced him to resign (1815). He went as ambassador to Dresden, but afterwards retired to Prague, and latterly to Trieste, where he died Dec. 25, 1820.

Fougasse (fö-gás'), milit. a little mine in the form of a well, 8 or 10 feet wide and 10 or 12 deep, dug under some work, fortification, or post, charged with powder, or powder and shells, and covered with stones or earth, for destroying the works by explosion.

Fougères (fö-zhār), a town N. E. France, dep. Ille-et-Vilaine, on a height, 28 miles N.E. of Rennes. It was once fortified, so as to be considered one of the keys of Brittany, but is now open, well built, and has manufactures of flannels, sailcloth, sacking, &c. Pop. 15,578.

Foula, an island belonging to the Shetland group, but lying solitary some 20 miles to the west. It rises from the sea in lofty cliffs which swarm with sea-fowl. Pop. 239.

Foulahs. See *Fellatahs*.

Foulis (fou'lis), ROBERT and ANDREW, two eminent printers of Glasgow, were born there — the former in 1707, the latter in 1712. Both were well educated at Glasgow University. In 1739 Robert commenced business as a bookseller, and having obtained the appointment of printer to the university began to issue editions of the ancient classics, which became famous for their accuracy and beauty. After some years Andrew entered into partnership with his brother, but outside speculations involved the firm in embarrassments. Robert died in 1771; and Andrew, who survived till 1781, failed to restore the character of the Foulis press.

Foundation, that part of a building which is under ground, or the portion of the ground on which walls, piers, &c., rest. Foundations are usually made by providing a hard impermeable base for the masonry by methods which vary according to the position and soil. Where there is rock below nothing more is needed than a dressing for the surface. Submerged foundations such as those for breakwaters, bridges, &c., form special cases for engineering.

Foundation, a donation or legacy, in money or lands, for the maintenance or support of some useful charitable institution, as an hospital, a college, a school, &c.

Foundation-stone, a stone of a public building laid in public with some ceremony. It has no necessary connection with the foundation of the building.

Founding. See *Casting*.

Foundling Hospitals, institutions for receiving children abandoned by their parents and found by strangers. Among such institutions are that of Paris, instituted in 1670, and that of London in 1739. The latter was originally a hospital for all exposed children; but the enormous increase in abandonments caused the hospital to be changed in 1760 to one for poor illegitimate children whose mothers are known. The

objection that foundling hospitals contribute to the corruption of morals is the strongest which can be urged against such institutions, and is not easily answered.

Foundry, a place where metal is melted and cast into the forms required in construction or decoration. Iron, brass, bronze, and type founding are special forms of the art. See *Casting*.

Fount, or FONT, among printers, &c., a quantity of types, in proportions sorted for use, that includes ordinary letters, large and small capitals, single letters, double letters, points, commas, lines, numerals, &c.; as a fount of Pica, Bourgeois, &c. A fount of 100,000 characters, which is a common fount, would contain 5000 types of *a*, 3000 of *c*, 11,000 of *e*, 6000 of *i*, 3000 of *m*, and about 30 or 40 of *k*, *x*, *y*, and *z*. But this is only to be understood of the ordinary types; capitals having other proportions, which we need not here enumerate.

Fountain, or ARTIFICIAL FOUNTAIN, a contrivance by which water is made to spout from an artificial channel, and often to rise up to a great height in a jet or jets. There are various kinds of artificial fountains, but in those of an ornamental character the water is usually made to rise in a jet by the pressure or weight of a head of water situated some distance above the orifice of issue, in which case the water will rise nearly to the same height as the head. In some cities the public fountains form a feature on the streets. Rome, in particular, is noted for its fountains. At Paris, also, the fountains of the Place de la Concorde, the Tuileries, and at Versailles, are splendid structures.

Fouqué (fö-kā), FRIEDRICH HEINRICH KARL, Baron de la Motte, a German poet and novelist, born in 1777, grandson of the Fouqué the subject of the next article. He served as lieutenant of the Prussian guards in the campaign of 1792, thereafter lived in rural retirement, but again returned to the army, and was present at the most important battles in the campaign of 1813. He died at Berlin in 1843. As a writer his work is marked by fantastic unreality and extravagance of conception. Several of his tales, Der Zauberring (Magic Ring), Undine, and Aslauga's Ritter (Aslauga's Knight), have been very popular. A translation of the latter was made by Carlyle.

Fouqué, HEINRICH AUGUST, Baron de la Motte, a distinguished Prussian general in the Seven Years' war, born in 1698, died in 1774. He was descended from an old Norman family which had fled on account of religious persecutions to the Hague. Fouqué's Mémoires, containing his correspondence with Frederick the Great, are highly interesting.

Fouquier-Tinville (fö-ki-ā-taŋ-vēl), ANTOINE QUENTIN, notorious for his ferocious cruelty in the first French revolution, was born in 1747. He was an attorney by profession, and having attracted the attention of Robespierre, was appointed public accuser before the revolutionary tribunal. His thirst for blood seems to have been increased by gratification, until it became a real insanity. He proposed the execution of Robespierre and all the members of the revolutionary tribunal in 1794, but was himself arrested, and died under the guillotine, in a cowardly manner, in 1795.

Fourchambault (för-shäŋ-bō), a town of France, dep. Nièvre, on the Loire. It has extensive iron-smelting furnaces and forges. Pop. 5949.

Fourcroy (för-krwä), ANTOINE FRANÇOIS DE, a French chemist, born in 1755. Having adopted the profession of medicine he applied himself closely to the sciences connected with it, and especially to chemistry. In 1784 he was made professor of chemistry at the Jardin du Roi; and the next year he was chosen a member of the Academy of Sciences. At this period he became associated with Lavoisier, Guyton-Morveau, and Berthollet in researches which led to vast improvements and discoveries in chemistry. When the revolution took place he was chosen a deputy from Paris to the national convention, but did not take his seat in that assembly till after the fall of Robespierre. In September, 1794, he became a member of the committee of public safety. In December, 1799, Bonaparte gave him a place in the council of state, in the section of the interior, in which place he drew up a plan for a system of public instruction, which, with some alteration, was adopted. He died in 1809. His works are numerous. We may mention his Système des Connaissances chimiques and Philosophie chimique.

Fourier (fö-ri-ā), FRANÇOIS MARIE CHARLES, a French socialist and founder of the system named after him, was born in 1772 at Besançon. He studied in the college of his native town, and subsequently at Rouen and Lyons occupied subordinate situations in mercantile houses. In the last-mentioned town he entered into busi-

ness on his own account, but lost all his money from the tumults of war and was forced to enlist in the revolutionary army. Discharged in 1795 on account of ill-health he returned to commerce, filling quite subordinate situations, till he died, Oct. 10, 1837. He wrote his books in his leisure hours and published them out of his scanty savings. His first book, Théorie des Quatre Mouvements et des Destinées Générales, was published in 1808; the Traité de l'Association Domestique Agricole, his most important work, in 1822; but it was not till the last years of his life that they attracted any notice. In his social system Fourier holds that the operations of industry should be carried on by *Phalansteries*, or associations of 1800 members combining their labour on a district of about a square league in extent, under the control of governors elected by each community. In the distribution a certain minimum is first assigned for the subsistence of every member of the society, whether capable or not of labour. The remainder of the produce is shared in certain proportions to be previously determined among the three elements, labour, capital, and talent. The capital of the community may be owned in unequal shares by different members, who would in that case receive, as in any other joint-stock concern, proportional dividends. The claim of each person on the share of the produce apportioned to talent is estimated by the grade which the individual occupies in the several groups of labourers to which he or she belongs, these grades being in every case conferred by the voice of his or her companions. The remuneration received would not of necessity be expended in common. Separate rooms or sets of rooms would be set aside for those who applied for them, no other system of living together being contemplated than such as would effect a saving of labour in building and the processes of domestic life, and reducing the enormous portion of the produce of industry at present carried off by middlemen and distributing traders to the narrowest possible margin.

Fourier, Jean Baptiste Joseph, a French mathematician, born at Auxerre 1768, was educated in the military school there, and after holding an appointment for a short time in the Polytechnic School followed Bonaparte to Egypt. Here he performed important political service, and was likewise secretary of the Institute of Egypt. After his return he was, in 1802, appointed prefect of the department of Isère. On Napoleon's return from Elba Fourier issued a royalist proclamation, but was nevertheless appointed prefect of the Rhone, though soon after deprived of the office. He now established his residence in Paris, lived entirely devoted to study, and was in 1815 admitted a member of the Academy of Sciences, and at a later period appointed secretary for life. He died in 1830. Amongst his principal works are the Théorie Analytique de la Chaleur (1822), and Analyse des Equations Determinées, published in 1831 after his death.

Fourierism. See *Fourier* (*François*).

Fourth, in music, a distance comprising three diatonic intervals, or two tones and a half. Three full tones compose a tritone or fourth redundant. The diminished fourth consists of a whole tone and two semitones.

Foveaux Strait (fō'vō), the strait between the South Island of New Zealand and Stewart's Island.

Fowey (fō'i), a seaport of England in Cornwall, near the mouth of the river Fowey, formerly one of the chief seaports of England. It carries on an extensive pilchard fishery. Pop. 1957.

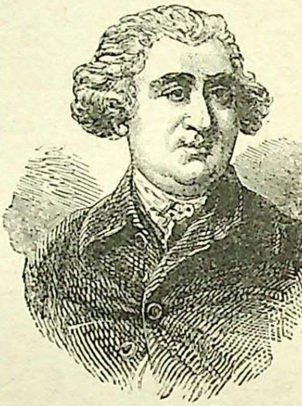
Fowl, a word originally synonymous with *bird*, now used in a stricter sense to designate the birds of the genus *Gallus*, of which the common domestic fowl (cock and hen) is a familiar example. The general form and characters of the bill, feet, &c., agree with those of the pheasants, but the crown of the head is generally naked and furnished with a fleshy comb, the base of the lower mandibles also bearing fleshy lobes or wattles—characters which are most conspicuous in the males. The legs of the male are furnished with spurs which are much used in conflict, the cocks being very pugnacious and unable to suffer the presence of a rival. In the centre of the cock's tail are two long feathers, which fall backwards in a graceful arch and add great beauty to the whole aspect of the fowl. Except in the pure white breeds the plumage of the cock is always more splendid than that of the hen. All the species are natives of the East Indies and the Malayan Archipelago. Some have thought that the *Bankiva Jungle Fowl*, a native of Java, is the original stock of the domesticated poultry. Amongst well-known varieties are the *Cochin-China Fowl*, the *Game Fowl*, the *Dorking*, the *Spanish Fowl*, and the *Bantam*.

Fowling, the taking of wild birds in numbers, either for food or for their feathers. It includes a variety of methods, such as the catching of small birds by nets; the taking of ducks and other water-fowl in decoys; the lowering of persons over the brink of precipices to seize the birds that lodge in their hollows and shelves, &c.

Fowling-piece, a light kind of gun for shooting birds of various kinds.

Fox, an animal of the genus *Vulpes*, closely allied to the dog, with a straight bushy tail, elongated pupils, and erect ears. Foxes are natives of almost every quarter of the globe, and are everywhere among the most sagacious and wily of all beasts of prey, very voracious, devouring birds and small quadrupeds, and committing ravages not only on animals, but on fruits, honey, eggs, &c. The common fox of Europe (*Vulpes vulgāris*) and Asia is well known. Among other species there are the Arctic fox (*V. lagōpus*), celebrated for its glossy white winter fur; the *black fox* (*V. argentātus*), similar to the common fox, but distinguishable by its rich, shining black fur, a native of the northern parts of Asia and America; the *gray fox* (*Urocyon Virginiānus*) has a thick tail containing at its tip a tuft of stiff hairs, common through the northern parts of America; the *red fox* of America (*V. fulvus*), generally of a pale-yellow hue; the *crossed fox* (*V. pennsylvanicus* or *decussātus*), fur a sort of gray, muzzle and lower parts of body black, a dark cross on the shoulders; the *swift fox* (*V. velox*), an inhabitant of the plains which lie at the base of the Rocky Mountains.

Fox, Charles James, an eminent English statesman, born January 24, 1749, the second son of Henry, first Lord Holland. He was sent to Eton, whence he removed to Hertford College, Oxford. His father procured him a seat for the borough of Midhurst in 1768, before he was of legal age, and in 1770 he was appointed one of the lords of the admiralty, which situation he resigned in 1772, and was appointed a commissioner of the treasury. After being a supporter of the administration for six years, a quarrel with Lord North threw Fox into the ranks of the Whig opposition, where, along with Burke and others, he steadily assailed the government, especially on the score of their American policy. In 1780 he was elected member for Westminster, and on the defeat of the administration of Lord North, and the accession of that of the Marquis of Rockingham, he obtained the office of secretary of state for foreign affairs (1782). But the death of the Marquis of Rockingham suddenly divided the party; and when the Earl of Shelburne became first lord of the treasury Fox retired. Soon after a union took place between his friends and those of Lord North, known as *the coalition ministry*, which was overthrown by Fox's famous East India Bill (1783). At the ensuing election nearly seventy of his friends lost their seats; but though Pitt had a decided majority, Fox still headed a very strong opposition,



Charles James Fox.

and for some years political questions were contested on both sides of the house with a great display of talent. He took an active part against Warren Hastings, supported the efforts of Wilberforce against the slave-trade, and moved the repeal of the Test and and Corporation Acts. He welcomed the breaking out of the French revolution, and his views on this subject led to a memorable break between him and his old friend Burke. Fox firmly opposed the principle on which the war against France was begun, and strenuously argued for peace on every occasion; but eventually, on becoming secretary for foreign affairs in 1806, acquiesced in its propriety. His health, which had been impaired by his loose manner of living, now began rapidly to decline, and he died the same year a few months after the death of Pitt, his great rival. As a powerful and purely argumentative orator he was of the very first class; although as to eloquence and brilliancy he perhaps yielded to Pitt, Burke, and Sheridan; nor were his voice and manner prepossessing,

although highly forcible. He was of an amiable nature, and a sincere friend to all broad and liberal principles of government. His History of the Early Part of the Reign of James II. was published posthumously.

Fox, George, the founder of the Society of Friends, or Quakers, was born at Drayton, in Leicestershire, in 1624, his father being a weaver. He was educated religiously, and at the age of nineteen persuaded himself that he had received a divine command to forsake everything else and devote himself wholly to religion. He accordingly forsook his relations, equipped himself in a leathern doublet, and wandered from place to place, supporting himself as he could. During this itinerant life he fasted much, sometimes sitting the whole day in a retired spot reading the Bible. In 1648 he commenced to preach publicly at Manchester, about which time he also adopted the peculiar language and manners of Quakerism. At Derby his followers were first denominated *Quakers*, in consequence of their trembling mode of delivery, and calls on the magistracy to tremble before the Lord. In 1655 he was sent a prisoner to Cromwell, who, having ascertained the pacific tendency of his doctrines, had him set at liberty. He was, however, treated with great severity by the country magistracy and the sterner Puritans, who disliked the mysticism and want of firm doctrines in his preaching. In 1666 he set about forming the people who had followed his doctrines into a formal and united society. In 1669 he married the widow of Judge Fell, and soon after went to America, where he remained two years, which he employed in making proselytes. On his return he was thrown into Worcester jail, but was quickly released, and went to Holland. He soon after returned, and was cast in a suit for tithes, which he deemed it unlawful to pay. In 1684 he again visited the Continent. He died in 1691, the Society of Friends having by that time acquired considerable importance. The writings of Fox have been collected into three volumes.

Fox-bats, or Flying-foxes, a name given to the fruit-eating bats of the family Pteropidæ, including some of the largest of the bat tribe, one species, the *Pterŏpus edūlis* or kalong, attaining a length of from 4 to 5 feet from the tip of one wing to the tip of the other. They inhabit Australia, Java, Sumatra, Borneo, &c., as well as the continents of Asia and Africa.

Foxe, John, an English church historian, born in 1517. He studied at Oxford, and was elected a fellow of Magdalen in 1543, from which he was expelled two years later on a charge of heresy. In the reign of Edward VI. he was restored to his fellowship, but during Mary's reign again went abroad, to Basel. On the accession of Elizabeth he returned to his native country, and was received in the most friendly manner by his former pupil, the Duke of Norfolk, who settled a pension on him. Secretary Cecil also obtained for him a prebend in the church of Salisbury; and he might have received much higher preferment if he would have subscribed to the articles enforced by the ecclesiastical commissioners. He died in 1587. His principal work is the History of the Acts and Monuments of the Church, commonly called Foxe's Book of Martyrs, first printed in 1563, in one vol. folio.

Fox'glove, a common British plant, *Digitālis purpurĕa*, nat. order Scrophulariaceæ. It grows on banks, pastures, &c., in hilly and especially subalpine and rocky countries in Europe. Its flowers are campanulate, and somewhat resembling the finger of a glove. It is one of the most stately and beautiful of the British herbaceous plants, and one that has great reputation as a medicinal plant, being employed as a sedative, narcotic, and diuretic in diseases of the heart and in dropsy. Its medicinal properties are due to the poisonous substance known as digitalin. A decoction or infusion of the leaves is what is generally used. The flowers are usually purple, but sometimes white. Several species are grown in gardens, such as *D. grandiflōra* and *D. lutĕa*, with yellow flowers, and *D. ferruginĕa* with brown.

Foxhound, a hound for chasing foxes, a variety of hound in which are combined, in the highest degree of excellence, fleetness, strength, spirit, fine scent, perseverance, and subordination. The foxhound is smaller than the staghound, its average height being from 20 to 22 inches. It is supposed to be a mixed breed between the staghound or the bloodhound and the greyhound. It is commonly of a white colour with patches of black and tan.

Fox-hunting, a favourite English sport much practised during the autumnal and winter months. A *pack* of foxhounds consists of from 20 to 60 couples of hounds according to the frequency of the hunting days. These dogs are carefully bred and trained (see *Foxhound*), and are under the superintendence of one experienced gentle-

man called the *master*, who has the general control of the whole 'field.' Under him are the *huntsman*, whose duty it is to look after the hounds in their kennels and direct them in the field. He is directly responsible for their condition and training. Next him are the *whippers-in*, whose main duty is that of assisting generally the huntsman both in the kennels and in the field. A less important function of the whipper-in is that of urging on lagging hounds. The night before the hunt, the gamekeeper, calculating on the habits of the fox to leave his burrow or 'earth' in search of food at night, stops all the 'earths' after the foxes have left them. The animals are thus forced to seek refuge in neighbouring thickets or other cover, generally near their 'earth,' and this fact determines the arrangements of the day's hunting. The huntsmen assemble in the neighbourhood of the stopped 'earth' and draw the neighbouring coverts by *throwing off* the dogs to search for the fox. The presence of the fox is generally indicated by the whine of some old and experienced hound who has first scented him; but he may *hang* or keep within the covert for a long time. The person who first sees the fox leave the covert, *break cover* as it is called, gives the *view-halloo* after it has got some little distance, upon which the huntsman collects his hounds and sets off in chase followed by the entire field. The foxhounds follow almost entirely by scent, the fox being itself perhaps far ahead and out of sight. Wherever, therefore, the scent fails the hounds are *at fault*, and there is a *check* till the scent is recovered. When the scent is good most of the hounds *own* it by giving tongue, and they are then said to be in *full cry*. The rider who is first in at *the death* lashes the hounds off and secures the head, feet or *pads*, and tail or *brush* of the fox. The midland counties of England, Leicester, Warwick, Yorkshire, &c., are the most celebrated for fox-hunting.

Fox Indians, a tribe of N. American Indians belonging to the Algonquin family, now few in numbers and scattered over the Indian territories, Iowa, Kansas, and Nebraska.

Fox River, a river of Wisconsin, U.S., which enters Green Bay, an arm of Lake Michigan, after passing through Lake Winnebago. It is connected by canal with the river Mississippi, and thus furnishes water communication between that river and the Atlantic.

Fox-shark. See *Thresher*.

Foxtail-grass, the common name given to the grasses of the genus *Alopecūrus*, because of the close cylindrical panicle in which the spikelets of flowers are arranged, having somewhat the shape of a fox's tail. Of the fourteen species known, six are natives of Britain. *A. pratensis* is an abundant natural grass in meadows and pastures, and is an excellent fodder plant. The alpine foxtail-grass (*A. alpīnus*) is a rare plant, being much prized and eagerly sought after as a botanical rarity.

Foy (fwä), MAXIMILIAN SEBASTIAN, a French general, born in 1775, and educated in the military school at La Fère. He served with distinction under Dumouriez, Moreau, and Masséna, in 1803 received the command of the floating batteries intended for the defence of the coasts of the Channel, and in 1805 commanded the artillery of the second division in the Austrian campaign. In 1807 he took part in the preparations for the defence of Constantinople against the British. From 1808 to 1812 he was general of division of the army in Portugal. In 1812, after the defeat of the French at Salamanca, he succeeded Marmont as commander-in-chief, and showed much talent in his conduct of the operations on the Douro. He was present in all the battles of the Pyrenees, until he was dangerously wounded at Orthez in 1814. In 1815 he commanded a division at Waterloo, where he was wounded for the fifteenth time. In 1819 he was appointed division-inspector of infantry, and the same year was elected deputy by the department of the Aisne. He at once distinguished himself as one of the leading orators of the liberal party and became very popular. He died at Paris, Nov. 28, 1825.

Foyers, FALLS OF, two romantic cataracts near the mouth of the little river Foyers, Inverness-shire, which falls into Loch Ness. The upper fall is about 30 feet in height, the lower, described by Professor Wilson as the 'most magnificent in Great Britain,' is about 90 feet.

Foyle, a river of Ireland, which flows north-east through Tyrone, Donegal, and Londonderry till it falls into Lough Foyle 4 miles below the city of Londonderry. It is navigable up to Londonderry for vessels of 800 tons.

Foyle, LOUGH, the estuary of the river Foyle, on the north coast of Ireland, between the counties of Derry and Donegal. It is 16 miles long from north-east to south-west,

1 mile wide at its entrance, and 9 miles broad in the interior. A great part is dry at low-water.

Fra, an Italian prefix, derived from the word *frate*, brother, and used before the names of monks; for instance, *Fra Giovanni*, brother John.

Fra Bartolomeo. See *Baccio della Porta.*

Fraction, in arithmetic and algebra, a combination of numbers representing one or more parts of a unit or integer: thus, four-fifths ($\frac{4}{5}$) is a fraction formed by dividing a unit into five equal parts, and taking one part four times. Fractions are divided into *vulgar* and *decimal*. Vulgar fractions are expressed by two numbers, one above another, with a line between them. The lower, the *denominator*, indicates into how many equal parts the unit is divided; and the number above the line, called the *numerator*, indicates how many of such parts are taken. A *proper fraction* is one whose numerator is less than its denominator. An *improper fraction* is one whose numerator is not less than its denominator, as $\frac{8}{8}$, $\frac{5}{2}$. A *simple fraction* expresses one or more of the equal parts into which the unit is divided, without reference to any other fraction. A *compound fraction* expresses one or more of the equal parts into which another fraction or a mixed number is divided. Compound fractions have the word *of* interposed between the simple fractions of which they are composed: thus, $\frac{1}{3}$ *of* $\frac{4}{5}$ *of* $1\frac{4}{7}$ is a compound fraction. A *complex fraction* is that which has a fraction either in its numerator or denominator, or in each of them: thus, $\frac{5\frac{1}{2}}{9}$, $\frac{8}{9\frac{2}{3}}$, and $\frac{5\frac{1}{2}}{6\frac{2}{3}}$ are complex fractions. In *decimal fractions* the denominator is 10, or some number produced by the continued multiplication of 10 as a factor, such as 100, 1000, &c.; hence, there is no necessity for writing the denominator, and the fraction is usually expressed by putting a point (·) before the numerator, as $\cdot5=\frac{5}{10}$; $\cdot25=\frac{25}{100}$; $\cdot05=\frac{5}{100}$. The expression 542·461 would thus be equivalent to $542\frac{461}{1000}$. All calculations are much simplified in decimal fractions; yet, simple as the system is, it was discovered first in the 15th century by the German mathematician Regiomontanus.

Fracture, in mineralogy, is the manner in which a mineral breaks, and by which its texture is displayed; thus, an *even* fracture shows a level face or plane of some extent; *uneven*, when the surface is rough and broken; *conchoidal*, when one side is convex and the other concave, as in a molluscous shell; *fibrous*, when the separated edges have the appearance of torn filaments; *hackly*, when there are many fine sharp points or inequalities.

Fracture, in surgery, is the breaking of a bone. It is simple when the bone only is divided; compound when there is also a wound of the soft parts leading down to the fracture. A fracture is termed *transverse*, *longitudinal*, or *oblique* according to its direction in regard to the axis of the bone. It is called *complicated* if accompanied with dislocation, severe contusions, wounded blood-vessels, or any disease which prevents the union of the bones and causes them to be very easily broken. A *comminuted* fracture is one in which the bone is broken into several small pieces at the point of rupture. An *incomplete* fracture is one in which only a portion of the fibres is broken. A *stellate* fracture is a series of fractures radiating from a centre. When a fracture takes place there is a pouring out of fluid—lymph—and cells from the blood contained in the vessels of the lining membrane of the bone as well as from the vessels of the soft parts which have also suffered injury. This material surrounds the broken ends of the bone, becomes firm and consolidated, and in about three weeks is hard enough to keep the broken ends in position. A formation of bone then takes place round the seat of fracture. This is called 'provisional callus,' because, when the process of repair is completed and true bone has formed to unite the break, it is re-absorbed and gradually disappears. Meanwhile a process of repair goes on between the broken ends, uniting them by the formation of true bone or 'definitive callus.' The more quickly and accurately after the break the broken ends are brought together, the more rapid will be the reunion. The treatment of a simple fractured bone is to bring the portions into their natural position and to keep them permanently thus, by splints of some kind, pasteboard splints, for instance, dipped in warm water, with wooden ones exterior to them; or a mass of plaster of Paris may be used for the same purpose.

Fra Diav'olo, a celebrated Neapolitan brigand, whose real name was Michele Pezza. He was born in Calabria in 1760. He quitted the trade of stocking-weaving for the army, and served for a time in the Papal legion. He afterwards became a monk, but was expelled on account of misconduct. He then joined a troop of bri-

gands, of which he became in a short time the leader. The government set a price upon his head; but later, having need of Fra Diavolo's services against the French, they pardoned him and gave him a colonel's commission. At the head of his band he harassed the French, took refuge in Calabria after the conquest of Naples by Bonaparte, and incited the people against the French. He fell at last into their hands in 1806, and was executed as a robber and incendiary. The Fra Diavolo of Auber's opera has little or nothing in common with the real Fra Diavolo.

Fraise, in fortification, a defence consisting of pointed stakes driven into the ramparts in a horizontal or inclined position.

Frambœ'sia (Fr. *framboise*, a raspberry), the yaws, a contagious disease prevalent in the W. Indies and some parts of Africa, characterized by raspberry-like excrescences: whence the name.

Franc, a modern French silver coin, but the name was given to two ancient coins in France, one of gold and the other of silver. The value of the gold franc was about half a guinea. The silver franc was in value a third of the gold one. The name was given from the device *Francorum Rex*, king of the French, on the coin when first struck by King John in 1360. The modern French franc is a silver coin and money of account which since 1795 has formed the unit of the French monetary system, and has also been adopted as the unit of currency by Switzerland and Belgium. It is of the value of a little over 9½*d*. English, and is divided into 100 centimes.

Francavilla, several places in Southern Italy. The most important is in the province of Lecce, 14 miles W.S.W. of Brindisi. Pop. 16,997.

France (anciently *Gallia*), a maritime country in the west of Europe, forming one of its most extensive, most populous, and most influential states. It is situated between lat. 42° 20′ and 51° 5′ N.; and lon. 4° 50′ W. and 7° 40′ E., and is bounded N. by the Straits of Dover and the English Channel; W. by the Atlantic (Bay of Biscay); S. by Spain and the Mediterranean Sea; E. and N.E. by Italy, Switzerland, Germany, and Belgium. Its greatest length from north to south is 600 miles, and its greatest breadth 547 miles. The coast-line on the whole is considerably diversified by bays, estuaries, and indentations of various kinds, and presents numerous good harbours and roadsteads. It is studded by a number of islands, especially in the north-west and west, the largest being Oléron, Ré, and Belle Isle. The total area (including Corsica) is 204,092 sq. miles. The capital is Paris; the other large towns in order of population are Lyons, Marseilles, Bordeaux, Lille, Toulouse, Nantes, St. Étienne, Havre.

Mountains.—The interior is traversed from south-west to north-east by successive chains of mountains, commencing with the Pyrenees and including the Cevennes, the Côte d'Or, the Vosges, and others, forming the water-shed, on one side of which the rivers flow west and north into the Atlantic and the English Channel, on the other side east and south into the Mediterranean. At its north-eastern extremity this system is met by the Alps and the Jura. A considerable portion of the Western Alps belongs to South-eastern France. Mt. Blanc itself (15,781 feet) is mostly within the French boundary-line. Some lofty Pyrenean peaks are also within French territory, the highest being Vignemale (10,792 feet). Near the centre of France, and separate from the great watershed of the country, are several groups of volcanic mountains known by the general name of the mountains of Auvergne, the chief peaks of which are the Plomb du Cantal (5983 feet), the Puy de Sancy (6100 feet), and the Puy de Dôme.

Rivers.—The spurs thrown off by the great watershed divide France into seven principal river basins, six of which are on the north-western slope and one on the south-eastern. These are:—1. The basin of the Garonne and its affluents (the Ariége, Tarn, Lot, and Dordogne on the right, and the Gers on the left); with the two secondary basins of the Charente on the north, and the Adour on the south. 2. The basin of the Loire and its tributaries (Nièvre and Maine on the right, the Allier, Loiret, Cher, Indre, Vienne, and Sèvre Nantaise on the left). 3. The basin of the Seine and its tributaries (the Aude, Marne, and Oise on the right, the Yonne and Eure on the left. To the north is the scondary basin of the Somme. 4. The basin of the Meuse with its affluent the Sambre. 5. The basin of the Escaut or Scheldt with its affluent the Scarpe. Only the southern portion of these two basins is included within the political boundaries of France. 6. The basin which pours a number of tributaries, the principal of which is the Moselle, into the Rhine. Only a comparatively small portion of this basin also


FRANCE
IN DEPARTMENTS
BY J. BARTHOLOMEW, F.R.G.S.
British Miles
Kilometres
Railways
SKETCH MAP OF PROVINCES
ENGLAND
BELGIUM
PRUSSIA
GERMANY
SWITZERLAND
ITALY
SPAIN
ENGLISH CHANNEL
BAY OF BISCAY
MEDITERRANEAN SEA
Gulf of Lions
Gulf of Genoa
CORSICA
(CORSE)
On the same scale
Channel Islands
Longitude East 6 from Greenwich
J. Bartholomew Edin.

is included within the political boundaries of France. 7. The basin of the Rhône, occupying the whole of the territory which lies to the south-east of the great watershed, the tributaries being the Ain, the Saône, Ardèche, and Gard on the right, and the Isère, Drôme, and Durance on the left. The secondary basins are those of the Var and the Aude. The four great rivers of France are the Loire, Seine, Rhone, and Garonne. France has in all more than 200 navigable streams, with a total navigation of about 6000 miles. Lakes are few, and individually very limited in extent.

Geology.—Among geological formations granite holds a chief place as forming the nucleus of the mountains generally, and being the prevailing rock in the Alps, the Pyrenees, the Cevennes, and in the north-west peninsular portion of the country (Brittany). The other crystalline rocks, consisting chiefly of trachytes and basalts, have received a magnificent development in Auvergne, where whole mountains are composed of them, and where the effects of remote volcanic agency are still visible in extinct craters and lava streams. In the Jura limestone occurs in such enormous masses as to have given its name to a peculiar formation (the Jurassic). The granite is overlaid by gneiss, micaceous and argillaceous slates, succeeded, particularly in the Pyrenees, by mountain limestone. The secondary formation, commencing with this limestone, is largely developed in many parts, and furnishes a considerable number of coal and mineral fields. The tertiary formation covers a vast extent of surface, particularly in the south-west and around Paris.

Climate.—Lying almost wholly within the more moderate portion of the temperate zone, between the isothermal lines of 50° and 60°, France has a climate not inferior to that of any country in Europe. In the south, and particularly the south-east, which is the warmest, the olive is successfully cultivated. Further north to a limit determined by a line drawn diagonally in an E.N.E. direction from the department of Gironde to that of the Vosges, the cultivation of maize or Indian corn extends. More northward still, a line drawn from the mouth of the Loire to Mezières in the Ardennes department marks the extreme limit of the profitable culture of the vine. Beyond this line is the fourth and coldest region. All these regions, notwithstanding their diversities of temperature, are generally healthy, and have an atmosphere remarkable for salubrity, serenity, and brightness.

Agriculture, &c.—About nine-tenths of the soil of France is productive, and about one-half of the whole is under the plough. The cereals forming the great bulk of the cultivated crops are wheat, oats, rye, and barley. The crops next in importance to these are meslin or mixed corn, potatoes, hemp, rape, maize, buckwheat, flax, and beet. Beet is cultivated extensively in some departments, especially in that of Nord, for the manufacture of sugar. The cultivation of tobacco is monopolized by the government, and is confined to certain departments. In France the grass is on a much more limited scale than the arable husbandry, and the breeding of cattle is indifferently practised. The rearing of sheep is more successful, much of the wool being scarcely inferior to merino wool. Excellent horses are bred in the north, and as there is an extensive demand for horses for the army, considerable pains are taken in the government studs to improve the breeds. Asses and mules, generally of a superior description, are much employed. The cultivation of the vine is one of the most important branches of French agriculture, the total quantity of land in vineyards being nearly a twenty-fifth of the whole surface. In everything relating to this branch of culture the French are unsurpassed, the various first-class wines which they produce under the names of Champagne, Burgundy, Bordeaux, &c., being universally known. It is estimated that in good years France produces about one-half of the whole wine production of the world. Since about 1870 the vineyards have suffered greatly from the devastations of the *Phylloxera*. Among the most important fruit-trees cultivated in France are the apple, from the fruit of which much cider is made, especially in Normandy; the chestnut, which in some of the central districts of France is a staple of food among the poorer classes; the mulberry tree, cultivated in the south-east both for its fruit and its leaves, the latter furnishing the food of the silk-worms so largely reared here; the olive also in the south-east; the pear, plum, peach, orange, citron, fig, &c. The forests occupy about one-seventh of the whole territory.

Minerals.—Coal-fields are numerous, but only two are really of importance—that of

Valenciennes in the north-east, forming the western extremity of the great Belgian coal-field, and that of St. Étienne in the south-east, to which the manufactures of that town, Lyons, and the surrounding districts, are indebted for much of their prosperity. The annual output falls so far short of the annual consumption that a large import takes place from England and Belgium, particularly the latter, and wood continues to be the common fuel throughout France, at least for domestic purposes. The coal-fields contain seams of iron, which are extensively worked, and furnish ore to a great number of blast-furnaces; but of the total amount of ore smelted in the country a considerable proportion is imported. Other metals, such as lead, zinc, manganese, copper, &c., are obtained to some extent. Common salt is obtained from mines of rock-salt, from salt-springs, and in still greater quantity from lagoons and salt-marshes on the coast.

Manufactures.—The most important of the textile manufactures is that of silk goods, having its chief seat at Lyons and the surrounding districts. It employs about two millions of persons, and furnishes about 27 per cent in value of the whole of the manufactured products of France. The value of the silk manufactured goods exported to the United Kingdom in 1895 was £11,000,000. After silk goods, though at a considerable distance, follow cotton stuffs and woollens, made largely at Rheims, Amiens, and Beauvais; carpets at Abbeville; tapestry at Paris and Beauvais; linens, including fine muslin, gauze, and lace at St. Quentin, &c.; cutlery, porcelain, stoneware, and common pottery, beet-root sugar, leather, paper, hats, hosiery, steel, iron, brass, and zinc ware, plate and flint glass, &c., besides many ornamental and artistic articles; jewelry, clocks, surgical instruments, types, engravings, &c., which have their common seat in the capital. The fisheries of France are important. Amongst the principal is that of sardines on the coast of the Bay of Biscay; that of herring, mackerel, turbot, salmon, &c., in the English Channel and the North Sea; that of tunnies and anchovies on the coasts of the Mediterranean. Oyster-breeding is largely engaged in, the most extensive oyster-beds being those of the basin of Arcachon in the department of the Gironde. Cod-fishing is carried on actively near the Newfoundland banks by French fishermen, and also near Iceland.

Commerce. — The principal towns from which the internal commerce emanates are Paris, Lyons, Rouen, Lille, St. Étienne, Toulouse, Nîmes, Nancy, Perpignan, &c. In 1887 the imports for home consumption amounted to £161,000,000; the exports of native products and manufactures to £130,000,000; in 1894, £154,000,000 and £123,000,000 respectively. The foreign commerce is chiefly with Britain, Belgium, Germany, and Italy. Britain is far ahead of the others, its imports from France being £43,450,000 in 1894; exports to France, £19,751,000; the former are chiefly silks, woollens, butter, eggs, wine and brandy, and sugar; the latter chiefly wool and woollens, cottons and cotton yarn, coal, machinery, and metals. The shipping of France is much below what might be expected from the development of its foreign commerce, considerably more than one-half of which is carried by foreign vessels. In 1895 the merchant navy of France included 14,332 sailing vessels of 2 tons and upwards, with a total tonnage of 398,567, and 1196 steamers of 491,972 tons. The chief seaports are Marseilles, Havre, Bordeaux, Rouen, Nantes (including St. Nazaire), Dunkirk, Calais, Boulogne, Dieppe.

Canals, Railways, &c. — The canals are numerous. The Canal du Midi, or, as it is sometimes called, the Canal of Languedoc, starting from a point in the Garonne a little below Toulouse, is continued in an E.S.E. direction into the lagoon of Thau, and thereby gives a continuous navigable communication between the Atlantic and the Mediterranean, in the line of the important towns of Bordeaux, Agen, Toulouse, Carcassonne, and Narbonne. In like manner three separate canals cut across the basin of the Rhône; the Canal du Centre, or of Charollais, connecting the Saône and the Loire; the Rhône and Rhine Canal, so called from uniting these two rivers, partly by the intervention of the Doubs; and the Canal of Bourgogne, connecting the Saône, Yonne, and Seine. In all France possesses about 3000 miles of canals in addition to about 6000 miles of navigable rivers, giving a total equal to about 1 mile of internal navigation for every 25 square miles of surface. The railways in France partly belong to the state, and partly have been granted to private companies for a limited period, at the end of which they become state property. In 1894 there were 22,560 miles of railway in operation. The total length of telegraph lines is 60,000 miles.

Administration of Justice.—In accordance with the general arrangement which divides the whole country into departments, each department into arrondissements, each arrondissement into cantons, and each canton into communes, there is a series of courts, commencing with the justice of peace (*juge de paix*) of each commune, who judges in petty causes, but whose more appropriate function is understood to be to act as a kind of umpire between parties at variance, and induce them to settle their differences without proceeding to formal litigation. Failing such arrangement the complainant brings his action before the court of first resort (*tribunal de première instance*), there being one such in every arrondissement, besides a *tribunal de commerce* to which mercantile and commercial causes are appropriated. From these courts an appeal lies to the courts of appeal (*cours d'appel*) of which there are twenty-seven, each having jurisdiction over several departments. The most important commercial and manufacturing towns have also commercial courts (*tribunaux de commerce*), the members of which are elected by the chief business men of the respective places. Above all these courts, and properly the only supreme court of the state, is the *cour de cassation*, which has the power of reviewing and annulling the decrees of inferior courts. It sits in the capital.

Education and Religion.—In France the superintendence of education in all its branches is expressly committed to a high functionary, who takes the name of minister of public instruction and fine arts and is assisted by an educational council. The highest educational institutions are either special institutions, such as the Museum of Natural History, the Collége de France, the Polytechnic school; or are a sort of university colleges known as 'faculties' (*Facultés de l'État*), each of which is specially devoted to literature, law, medicine, theology, &c. Several of these are usually grouped together to form one *académie*, there being sixteen academies in all. At these establishments the education given is of the highest description, and need not be particularized. Secondary instruction, either classical or commercial and industrial, is given by the state in the lyceums, by the communes in the communal colleges, or in certain other seminaries. There are about 90 lyceums, generally situated in the capitals of the departments, and over 250 colleges. Primary instruction is given in the communal schools, being compulsory and free. Religion, in like manner, is taken under the cognizance of the state, and falls within the province of the minister of justice and religion. The state declares that the Roman Catholic is the religion of the majority, but does not establish it; on the contrary, it places all forms of religion which have more than 100,000 adherents, and are not obviously subversive of social order, on an equal footing, and professes to deal impartially with all by paying salaries to their ministers. In the Roman Catholic Church are 17 archbishops and 67 bishops. (See also *Gallican Church.*) The Protestants are less than 2 per cent of the whole population.

Army and Navy.—By law military service is declared to be obligatory upon every Frenchman who is not pronounced unfit for military service. They have to serve first in the regular army (*armée active*) for three years, then in the reserve of the regular army for ten years, next in the territorial army for six years, and finally in the reserve of the territorial army for six years. This gives France on a peace footing an army of more than half a million, which on a war footing may be brought up to two and a half millions or even more. The French navy is manned partly by conscription and partly by voluntary enrolment. In 1900 the effective war navy of France included 38 heavy fighting vessels, of which, however, some, though launched, were not completed; 13 more were for coast service, besides other iron-clads still on the stocks.

Finance.—France has now a larger revenue, expenditure, and public debt than any other country in the world. The estimated gross revenue for 1896 was fully £137,000,000, the expenditure being estimated at somewhat less. The consolidated debt amounts to about £850,000,000, while the total national debt is at least about £1,200,000,000. The chief items of revenue are excise and customs, registration, stamps, posts and telegraphs, and other state monopolies, land tax, licenses, &c.

Constitution.—France has been a republic since the overthrow of the second empire by a Paris mob on the 4th of September, 1870. The details of the constitution were fixed by a law passed by a national assembly which met in 1871 (some revision having been made since). This law places the legislative authority in the hands of an assembly composed of two chambers, the chamber

of deputies and the senate. The chamber of deputies is elected by universal suffrage, each arrondissement forming an electoral district and a member being elected for every 70,000 inhabitants. The total number is 584, 6 being for Algeria and 10 for the colonies. The deputies are elected for four years. The senate consists of 300 members, of whom 75 were originally elected for life; but in 1884 it was enacted that vacancies among the life senatorships should be filled up as they arose by the election of ordinary nine-year senators. Both senators and deputies are paid. The head of the government is a president, elected for seven years by a majority of votes of the members of the two chambers sitting as one. The president is assisted by a body of ministers appointed by him. He has the appointment to all civil and military posts.

Weights, Measures, and Money.—The unit of the French monetary system is the franc (of the value of about 9½*d.*), which is divided decimally. (See *Decimal System.*) The system of weights and measures is also decimal, the units with their English equivalents being as follows:—the mètre = 39·37 inches or 3·28 feet; the kilomètre, or 1000 mètres = 1093·6 yards or ·621 of a mile; the are, the square of 10 mètres = 1076·441 square feet; the hectare, or 100 ares = 2·47 acres; the square kilomètre = ·386 of a square mile; the stère or cubic mètre = 35·317 cubic feet; the litre = 1·76 pints; the hectolitre or hundred litres = 22·0097 gallons; the gramme = 15·4323 grains; the kilogramme or 1000 grammes = 2·205 lbs.

Political Divisions and Extent of Empire.—Before the revolution of 1789 France was divided into general governments or provinces, the number of which varied at different epochs. Under Francis I., by whom they were instituted, there were nine, namely, Normandie, Guyenne, Languedoc, Provence, Dauphiné, Bourgogne, Champagne-et-Brie, Picardie, Ile de France. Under Henry III. there were twelve, formed by the addition of Bretagne, Orléanais, and Lyonnais. Under Louis XIV. the number was fixed at thirty-two, to which a thirty-third was added by the acquisition of Corsica under Louis XV. At the revolution the whole of France, including Corsica, was parcelled out into departments, and each department subdivided successively into arrondissements, cantons, and communes. This division, carried out in 1790, has since maintained its ground. The number of departments was originally eighty-three, but it has been at different times increased and decreased. There are now eighty-seven departments, the last formed being Haut-Rhin (Belfort). The average area of each is about 2300 sq. miles (more than one-third that of Wales). The most recently acquired territories were Nice and Savoie. By the Franco-German war of 1870-71 nearly all Alsace and part of Lorraine was lost. In addition to the territory it occupies in Europe, France possesses (either absolutely or as protected territories) Algeria, Tunis, Senegambia, part of the Soudan, Obock, a large area of the Congo region, Réunion, Madagascar, and other East African islands; Cochin-China, Tonquin, Anam, and other possessions in Asia; French Guiana in S. America, with the islands of Guadeloupe, Martinique, &c.; New Caledonia, Tahiti, &c., in the Pacific. The total French dominions are thus as follows:—

	Area in Sq. Miles.	Population.
France,	204,092	38,343,192
Asiatic Possessions,	306,840	20,814,000
African do.	1,150,000	18,000,000
American do.	36,000	387,680
Oceanic do.	10,500	90,500
Totals,	1,707,432	77,635,372

History.—France or Gaul, at the earliest period of which anything is known with regard to it, was inhabited by a number of independent tribes, who appear to have been mainly Celtic in race. In the latter half of the 2d century B.C. the Romans conquered a portion of the south-east, and under Julius Cæsar the conquest of all Gaul was completed between 58 and 51 B.C. (See *Gaul.*) Subsequently the country became completely Romanized in language, civilization, and religion, and many flourishing towns sprang up. In the decline of the Roman empire German tribes began to make settlements in Gaul, and it was from a body of these known as *Franks*, that the name France arose. Towards the end of the fifth century Clovis, chief of the Salian Franks, made himself master not only of almost all France (or Gaul), but also of a considerable territory east of the Rhine. The dynasty which he founded was called the Merovingian from his grandfather Merovæus. Clovis died in 511, leaving his kingdom to be divided amongst his four sons as subsequent rulers often did. The Frankish dominions were thus differently divided at different

times; but two divisions, a western and an eastern, or Neustria and Austrasia, became the most important. A large part of the history of the Franks under the Merovingian kings is the history of the contests between these two states. Latterly Pippin or Pépin d'Héristal, mayor of the palace of the Austrasian king, conquered Neustria and made his sway supreme throughout the kingdom of the Franks. This date may be regarded as that of the real termination of the Merovingian line, for although kings belonging to this family continued to be crowned till 752, they were mere puppets, 'rois fainéants' as they are generally called: the real power was in the hands of the mayors of the palace. Pépin died in 714. He was succeeded, after a brief period of anarchy, by his son Charles Martel, or Charles the Hammer—a title he earned by the courage and strength he displayed in battle. During his tenure of power all Europe was threatened by the Saracens, who, after occupying Spain, had penetrated into France, and were met by Charles Martel on a plain between Tours and Poitiers, and totally defeated (732). Charles Martel died in 741, leaving Austrasia and the countries beyond the Rhine to his son Carloman, and Neustria and Burgundy to his son Pépin the Short. On his brother's death Pépin seized his heritage, and in 752, thinking it time to have done with the system of *rois fainéants*, had himself crowned King of the Franks. In 768 he died, and was succeeded by his sons Charles, afterwards known as Charlemagne (Charles the Great), and Carloman. The latter dying in 771, Charlemagne then became sole ruler, and conquered and organized an empire which extended from the Atlantic on the west to the Elbe, the Saale, and the Bohemian mountains on the east, and embraced also three-fourths of Italy, and Spain as far as the Ebro. By Pope Leo III. on Christmas-day in the year 800 he was crowned in the name of the Roman people as Emperor of the West. There was as yet, strictly speaking, no kingdom of France, and Charlemagne was a German, and his empire a German one.

To Charlemagne succeeded in 814 his youngest son Louis *the Pious*. At the death of the latter the empire, after many disputes, was eventually divided by the Treaty of Verdun in 843 amongst his sons, the portion nearly corresponding to modern France falling to Charles the Bald. From this time the separate history of France properly begins, the history of the French language being also traced to the same period, while the eastern portion of the old Frankish territory remained German. After Charles the Bald, the first of the Carolingian kings, had been succeeded in 877 by Louis II., and Louis II. by Louis III. (879–882) and Carloman (879–884), Charles the Fat, king of the eastern Frankish territory, became ruler of the western also till 887, when he was deposed. After a brief usurpation by Eudes, Count of Paris, Charles III., the brother of Louis III., was recognized as king. But his kingship was little more than nominal, France being divided into a number of great fiefs, the possessors of which though acknowledging the feudal supremacy of Charles were practically independent. In these circumstances Charles, unable to offer any adequate resistance to the Norman pirates who were devastating the coast and making incursions into French territory, surrendered to them, in 912, the province which took from them the name of Normandy. Towards the end of his reign Hugh of Paris, as he is generally called, duke of France, was really the most powerful person in the kingdom, and throughout the reigns of Louis IV., Lothaire and Louis V., he and his son Hugh Capet held the real power. On the death of Louis V. without children in 987 Hugh Capet mounted the throne himself, and thus became the founder of the Capetian dynasty. The great fiefs of Paris and Orleans were thus added to the crown, and Paris became the centre of the new monarchy.

The first task of the Capetian line was to reconquer the royal prerogatives from the great vassals, but for two centuries without much success. Hugh Capet died in 996, and his first three successors, Robert (died 1031), Henry I. (died 1060), and Philip I. (died 1106), effected nothing whatever towards the establishment of the royal authority. Louis VI. was more successful, being greatly helped by the fact that the nobility had been much weakened by the Crusades. The growth of the towns also, which ultimately became the allies of the kings, was a powerful check on the nobles.

Louis VI. died in 1137, and was succeeded by his son Louis VII., who reigned till 1180. During his reign the stability of the French throne was endangered by the influence acquired in France by Henry II. of England, who possessed, either by inheritance or by his marriage with Eleanor

of Aquitaine, the whole of the west of France except Brittany. Louis was succeeded by his son Philip Augustus (Philip II.), who did much to strengthen the throne, depriving John, king of England, of Normandy, Maine, and Anjou. His son Louis VIII., who succeeded in 1223, carried on the work by the conquest of Poitou, and a religious war being proclaimed against the counts of Toulouse, who protected the Albigenses, that house was extinguished, and their domains passed to the royal family. Louis VIII. died in 1226, and under the wise rule of Louis IX. (St. Louis) the influence of the crown went on increasing, as it did also under Philip (III.) the Bold (died 1285), Philip (IV.) the Fair (died 1314), Louis X. (died 1316), John I. (died 1316, after a reign of five days), Philip V. (died 1322), and Charles IV. (died 1328), by the acquisition of fresh domains and other means until the outbreak of the wars with England.

The first branch of the Capetian line of kings became extinct on the death of Charles IV., the last of the sons of Philip the Fair, the Salic law excluding the female succession. The crown thus fell to Philip of Valois, a cousin, who became king as Philip VI. His claim was disputed by Edward III. of England, and the dispute led to a series of wars which were not terminated for more than 120 years. During this period France was reduced to a state of great misery. While Edward, victorious over Philip VI., and after his death over John (II.) the Good, who was taken prisoner at Poitiers in 1356, compelled the surrender to England of some of the finest provinces of France by the Treaty of Brétigny in 1360, the country was plundered by banditti, and the Jacquerie, a mass of furious peasants (about 1358), satiated their spirit of vengeance in the blood of the nobility. Charles (V.) the Wise, who succeeded John the Good in 1364, and his constable, Du Guesclin, were able to restore order only for a short time, although during this reign the English were driven out of most of their possessions in France. Then came the long and unhappy reign of the imbecile Charles VI. (1380–1422), during which Henry V. of England, reviving the claim of Edward III. to the French crown, invaded France, won the field of Agincourt, and obtained a treaty (Treaty of Troyes), acknowledged the right of succession to the French crown in himself and his descendants. Charles VI. died in 1422, a few weeks after Henry V., whose son, Henry VI., a minor, was acknowledged as king by the greater part of France. But between 1429 and 1431 the peasant girl JOAN OF ARC animated the French in the cause of the dauphin, who was crowned as Charles VII. at Rheims in 1429, and in 1451 the English had lost all their possessions in France, except Calais. The shrewdness and perfidy of Louis XI. (1461–83) completed the subjugation of the great barons, and laid the foundation of absolute monarchy. Maine, Anjou, and Provence were left to him by the will of the last count, and a large part of the possessions of the Duke of Burgundy, including Picardy, Artois, the duchy of Burgundy proper, and Franche Comté, all came into his hands not long after the death of Charles the Bold, in 1477. His son and successor, Charles VIII. (1483–98), united also Brittany to the crown by his marriage with Anne, the heiress of the fief, and effected a conquest of Naples, which lasted but a short time.

Charles was the last king of the direct line of Valois, which was succeeded by the collateral branch of Valois-Orleans (1498), in the person of Louis XII., who was descended from Louis of Valois, duke of Orleans, brother of Charles VI. In order to keep Brittany attached to the crown he married the widow of his predecessor. On his death the crown reverted to another branch of the house of Valois, that of Angoulême, Francis I. (1515–47) being the grandson of John, count of Angoulême, uncle of Louis XII. Francis I. still continuing the attempts at conquest in Italy, was brought into conflict with Charles V. of Germany, who also claimed Milan as an imperial fief. The result was five wars between France and Germany, in the first of which Francis had to retreat across the Alps; in the second he was taken prisoner at Pavia; in the third he seized Savoy and Piedmont, which the Peace of Crespy (1544), made at the conclusion of the fourth war, allowed him to keep.

Francis I. died in 1547, and his son, Henry II. (1547–59), pursuing the same policy, renewed the war for the fifth time with the house of Hapsburg. In the Peace of Cateau-Cambrésis (1559), with which it ended, Henry had to surrender Savoy and Piedmont, but remained in possession of the German bishoprics of Metz, Toul, and Verdun. The year before, Calais, the last English possession in France, had been captured by Francis, duke of Guise. Francis

II., the husband of Mary Queen of Scots, succeeded his father Henry, but reigned little more than a year (1559–60). The foundation of the national debt, the weight of which broke down the throne 250 years later, was laid in this period. Intrigue and corruption gave to women a dangerous influence at court and in public affairs. Under the administration of Charles IX. (conducted during his minority by the queen-mother, Catharine de' Medici) France was inundated with the blood of Frenchmen, shed in the religious wars from 1562. (See *Bartholomew's Day.*) These continued throughout the reign of Charles IX. and his successor, Henry III. (1574–89), and were only terminated when Henry IV. originally king of Navarre, and since the death of Henry III. king of France, went over to the Catholic Church (1593), having hitherto been the leader of the Huguenots.

Henry IV. was the first French sovereign of the house of Bourbon, which inherited its right to the throne from a son of Louis IX. He united to the crown of France the Kingdom of Navarre, which he had inherited from his mother, Jeanne d'Albret. In his government of France Henry showed all the qualities of a great prince and a great statesman, establishing religious toleration (Edict of Nantes, 1598), and labouring diligently for the welfare of the state. He was cut off prematurely by the dagger of the fanatic Ravaillac (1610). During the minority of Henry's son Louis XIII. the French policy was at first wavering, until the prime-minister, Cardinal Richelieu, gave it a steady direction. He restored the French influence in Italy and the Netherlands, humbled Austria and Spain, and created that domestic government which rendered the government completely absolute.

Louis XIII. died in 1643, the year after his great minister, and was succeeded by Louis XIV., 'le Grand Monarque.' The policy of Richelieu was carried on by Mazarin during the regency of Anne of Austria, while Louis was still a minor, and also for some years after Louis was declared of age. During his ministry France obtained by the Peace of Westphalia (1648) the German province of Alsace, and by the Peace of the Pyrenees (1659) parts of Flanders, Hainault, Luxembourg, &c. After the death of Mazarin, in 1661, Louis XIV. took the government into his own hands, and ruled with an absolute sway. The period which immediately followed was the most brilliant in French history. His ministers, especially Colbert, and his generals, Turenne, Condé, Luxembourg, and the military engineer Vauban, were alike the greatest of their time; the writers of the period were also among the greatest in French literature. An unsuccessful attempt was made on the Spanish Netherlands; a war was undertaken against Holland, Spain, and Germany, which ended in France receiving Franche Comté and other places from Spain, and Freiburg from Germany. In 1681 Strasbourg was seized from the empire in a time of peace. The last war of Louis was the war of the Spanish Succession (1701–14), which resulted unfortunately for France. During this reign great injury was done to French industry by the revocation of the Edict of Nantes in 1685. Louis XIV. died in 1715, leaving the finances in disorder, and a national debt amounting to no less than 4,500,000,000 livres. Louis XV., the grandson of Louis XIV., succeeded at the age of five years. During his minority the regent, the Duke of Orleans, squandered the revenues in the most reckless manner, and matters went from bad to worse. In 1723 Louis was declared of age, but he sank under the pernicious influences of mistresses like Pompadour and Du Barry into extravagance and license, entering into useless and costly wars (war of Austrian Succession, 1740–48; Seven Years' War, 1756–63), and contracting enormous debts. During this reign two important acquisitions were made by France, namely, Lorraine and Corsica.

With the reign of Louis XVI. began the period of expiation for the misdeeds of the French monarchy and aristocracy, which had culminated in the preceding reign. The king himself was amiable, but the whole administration was rotten, and the court, the nobility, and the clergy formed only one privileged class united to oppress the people. The good intentions of Louis were neutralized by a total lack of energy and firmness. The first difficulty of his government, and the rock on which it split, was the hopeless condition of the public finances, with which Turgot, Necker, Calonne, Brienne, and again Necker tried in vain successively to grapple. Finding all ordinary measures unavailing, Necker demanded the convocation of the States General, which had not met since 1614. They met on 5th May, 1789, but as the nobles and clergy refused to conduct business so as to give the Third Estate its due weight, the deputies of this body assumed the title of the National Constituent

Assembly, and resolved not to separate till they had given a constitution to France. The clergy and nobles then yielded, and the fusion of the three orders was effected on 27th June. Foreign troops, however, were brought to Paris to overawe the assembly. The people now demanded arms, which the municipality of Paris supplied; and on 14th July the Bastille was captured and destroyed. Lafayette was made commander of the newly-established national guard. On the 4th August a decisive step was taken by the abolition of all feudal rights and privileges. On 5th October Versailles was attacked by the mob, and the royal family, virtually prisoners, were taken to Paris by Lafayette. The king tried to obtain the aid of some of the foreign powers against his subjects, and made his escape from Paris (20th June, 1791); but he was recognized, arrested at Varennes, and brought back to Paris. On 30th September, 1791, the assembly brought its work to a finish by producing a new constitution, which was sworn to by the king on 14th September, and he was then reinstated in his functions. This constitution deprived the king of arbitrary powers, provided liberty of worship and freedom of the press, of commerce, of industry; abolished the laws of primogeniture and entail as well as titles; all France was redivided into eighty-three departments, nearly equal in extent.

The Constituent Assembly was, according to the constitution, immediately followed by the Legislative Assembly, which met Oct. 1, 1791, and in which there were two parties of political importance, the Girondists, moderate republicans, so named because their leaders came from the department of the Gironde, who led it, and the Montagnards, extreme radicals known collectively as the Mountain, because their seats were the highest on the left side of the hall, who subsequently became all-powerful in the convention. The constitutionalists and monarchists were already powerless. The declaration of Pilnitz by the Emperor of Germany and the King of Prussia, threatening an armed intervention on behalf of the king, compelled the assembly to take a decisive course, and on 20th April, 1792, war was declared against Austria and Prussia. Reverses to the French troops caused a popular rising, and the Tuileries, after a sanguinary combat, were taken and sacked. The king took refuge with his family in the Assembly, which was invaded and compelled to submit to the dictation of the victors by assenting to the suspension of the king and the convocation of a National Convention in place of the Assembly. The first act of the Convention was to proclaim a republic. On 3d December the king was cited to appear before it. On 20th January, 1793, he was sentenced to death within twenty-four hours, and on the 21st the sentence was executed. This violent inauguration of the republic shocked public opinion throughout Europe, and armed the neutral states against France. England, Holland, and Spain joined the coalition. The extremists in France only grew more violent, a committee of public safety, with sovereign authority, was appointed 6th April, and the Reign of Terror begun. The struggle between the Girondists and the Montagnards or Jacobins terminated in favour of the latter. A new constitution was adopted by the Convention on 23d June, called the Constitution of the Year 1, the Republican Calendar being adopted on 5th October, 1793, the year 1 beginning on Sept. 22, 1792. Christianity was formally abolished. Risings against the government were put down with frightful bloodshed. Both in Paris and the provinces executions and massacres of persons alleged to be disaffected to the party in power followed each other daily. The queen was executed on 16th October, 1793, the Girondists on 31st October, and others followed, Robespierre being foremost in the bloody work. At length the reign of terror came to an end by the execution of Robespierre and his associates on 27th and 28th July, 1794. Danton and Hébert, his old allies, he had already brought to the scaffold. Marat, another man of blood, had perished by assassination. The campaigns of 1793 and 1794 resulted favourably to the French arms, which were carried beyond the French frontier, Belgium and Holland being occupied, Spain being invaded, and the allies being driven across the Rhine. These successes induced Prussia and Spain to sign the treaties of Basel (1795), recognizing the French republic. In 1795 the Convention gave the republic a new constitution, a chamber of *Five Hundred* to propose the laws, a chamber of *Ancients* to approve them, an executive of five members, one elected annually, called the *Directory*. The Convention was dissolved on 26th October.

Napoleon Bonaparte now began to be the most prominent figure in French affairs; and after his brilliant successes against the Austrians both north and south of the Alps,

and his empty conquest of Egypt, it was not difficult for him to overthrow the government of the Directory. This was accomplished in the revolution of 18th and 19th Brumaire (9th 10th Nov. 1799), the Directory being succeeded by the Consulate, Bonaparte himself being appointed *First Consul* for ten years. The other two consuls, Cambacérès and Lebrun, were to have consultative voices only. The new constitution (constitution of the year VIII. originally devised by Siéyès) was proclaimed on 15th December. Under the appearance of a republic it really established a military monarchy. The history of France for the next sixteen years is virtually the history of Napoleon. (See *Napoleon I.*) In 1802 the constitution was amended, Napoleon being made consul for life, with the right of appointing his successor. In 1804 he was proclaimed emperor, this being confirmed by a popular vote of 3,572,329 against 2569. The emperor was consecrated at Paris by Pius VII., and in 1805 he was also crowned King of Italy. For years the continental powers, whether singly or in coalitions, were unable to stand against him, though at sea France was powerless after the great victory by Nelson over the French and Spanish fleets at Trafalgar (1805). The Austrians and Russians were decisively defeated at the great battle of Austerlitz (1805); the King of Naples was dethroned and Napoleon's brother Joseph put in his place; another brother, Louis, was made king of Holland; while for a third, Jerome, the Kingdom of Westphalia was erected (1807). Prussia was conquered and compelled to accede to humiliating terms. Napoleon was at the height of his power in 1810 and 1811, his empire then extending from Denmark to Naples, with capitals at Paris, Rome, and Amsterdam. By this time, however, the Peninsular War (see that art.) had broken out, which was one immediate cause of his downfall, the disastrous Russian campaign of 1812 being another. The latter cost the French the loss of at least 300,000 men. A new coalition was now formed against Napoleon, and in 1813 he was disastrously defeated by the allies at the great battle of Leipzig. By this time the Peninsular War was drawing to a close and Southern France was actually invaded by Wellington. The allies entered Paris on 31st March, 1814. Napoleon abdicated and received the island of Elba as a sovereign principality. Louis XVIII. was proclaimed king of France, and concluded the Peace of Paris (May 30, 1814). A congress of the great powers had assembled at Vienna to adjust European affairs, when it was announced that Napoleon had left Elba, returned to Paris 20th March, 1815, and been reinstated without resistance in his former authority. The allied sovereigns proclaimed him an outlaw and renewed their alliance against him. Napoleon, anticipating the attack, crossed the Sambre with 130,000 men, defeated Blücher in the battle of Ligny, and marched against the British, who had taken position at Waterloo. Here on the 18th was fought the decisive battle which resulted in his final overthrow. On the 7th July the allies entered Paris for the second time. Napoleon surrendered to the British and was sent to St. Helena as a prisoner.

Louis XVIII. at first governed with the support of a moderate Liberal party, but the reactionary spirit of the aristocrats and returned émigrés soon got the upper hand; the country, however, was prosperous. Louis having died 16th Sept., 1824, his brother, Charles X., succeeded. On 26th July, 1830, the Polignac ministry, strongly reactionary in its tendencies, published ordinances suppressing the liberty of the press and creating a new system of elections. The result was an insurrection during the three days 27th–29th July by which Charles X. was overthrown and Louis Philippe of Orleans proclaimed king 9th August, 1830. During the last days of Charles X.'s reign a French expedition had captured the city of Algiers and laid the foundation of the French colony there. During the eighteen years of Louis Philippe's reign the chief events were the taking of the Citadel of Antwerp, the temporary occupation of Ancona, both in 1832, and in 1835 the completion of the conquest of Algeria. But latterly, under the ministry of Guizot, a policy of resistance to all constitutional changes was adopted, and a strong opposition having been formed, on 24th February, 1848, another revolution drove Louis Philippe into exile. A republic was proclaimed, and on the 10th December, 1848, Louis Napoleon, nephew of the great Napoleon, was elected president for four years. The president, having gained the favour of the army, dissolved the legislative assembly on 2d December, 1851, put down all resistance in blood, and by this *coup d'état* established himself as president for the further term of ten years. A plébiscite of 7,839,216 votes confirmed the appoint-

ment. On 2d December the president was declared emperor under the title of Napoleon III. (a son of the great Napoleon being counted as Napoleon II.); and a plébiscite of 7,824,129 votes was again got to confirm the appointment. The Crimean war (1854-55) and the war against Austria on behalf of Italy (1859) distinguished the early part of his reign. The latter greatly aided in the foundation of a United Italy, and gave France the territories of Savoie and Nice (1860). In 1870 the uneasiness of Napoleon and the French at the steady aggrandizement of Prussia broke out into flame at the offer of the Spanish crown to a prince of the house of Hohenzollern. France, not satisfied with the renunciation of the German prince, demanded a guarantee from the King of Prussia that the candidature should never be resumed. This being refused France declared war. (See *Franco-German War.*) One French army was driven back by the Germans and cooped up in Metz, another was pushed northwards to Sedan, and so hemmed in that it had to surrender with the emperor at its head. On the news of this disaster reaching Paris the republic was proclaimed. After an almost uninterrupted series of victories the Germans became masters of the French capital (28th January, 1871), and the war ended in France giving up to Germany Alsace and a part of Lorraine, and paying a war indemnity of five milliards of francs (£200,000,000). Meanwhile civil war had broken out in Paris, which was suppressed with great difficulty. (See *Commune of Paris.*) The assembly elected in 1871 for the ratification of peace with Germany found it expedient to continue their functions, Thiers being the head of the administration. In 1873 the Thiers administration was overthrown and replaced by one under Marshal MacMahon. In 1875 a republican constitution was drawn up. In 1879 MacMahon resigned his presidentship before its legal expiry, being succeeded by Jules Grévy, who has been followed by Carnot (assassinated), Casimir-Perier, Faure, and Loubet. In 1881 France occupied Tunis as a protectorate. The same year primary education was made compulsory and free. In 1883-84 France took possession of Tonquin and established a protectorate over Anam, proceedings which led to hostilities with China. France has also reduced Madagascar to submission, having sent a military expedition there in 1895.

French Language.—At the time of the conquest of Gaul by Julius Cæsar, the principal dialects spoken by the inhabitants were Celtic. After the conquest of Gaul by the Romans all these dialects were gradually supplanted by Latin except in Brittany, where a Celtic dialect still holds its ground. The popular Latin of Gaul of course exhibited considerable differences from the written and classic Latin, and by the 7th or 8th century the literary and the popular languages had come to be quite clearly distinguished as the *Latina* and the *Romana* respectively. Besides the Celtic words, not very numerous, which were imported into the new speech, it was considerably modified by Celtic habits of speech, new sounds being introduced. It was still further modified by the influences introduced with the Teutonic invasions. The half-barbarous conquerors, incapable of mastering the intricacy of Latin inflections, mostly neglected them, using only the simpler forms. They enlarged the vocabulary also by a number of words, mostly terms of war, hunting, &c. After the Franks in Gaul had abandoned their native language and adopted this new Romanic or Romance tongue it became known as the *Francisca*, later *Franceis*, from which the modern term *French* is derived. The oldest known monument of the new dialect is the oath of Louis the German, taken at Strasburg in 842. In the 9th and 10th centuries two main branches or groups of dialects came to be recognized, the *Langue d'Oc*, spoken in the districts south of the Loire, and the *Langue d'Oil*, spoken in a variety of dialects in the provinces of the north and the east. The former may be said to have reached its height in the Provençal poetry and dialect, known especially in connection with the Troubadours. In the 13th century the political superiority of the north threw the Langue d'Oc into the shade and a dialect of the Langue d'Oil spoken in the central province of Ile de France, where the capital, Paris, was, came to be regarded as the classical language of the country, all other dialects sinking into the condition of *patois*. At the beginning of the 16th century Francis I. prohibited the use of Latin at court and in the public tribunals and formally recognized the French as the national language. As one of the Romance languages it is a sister tongue of Italian, Spanish, and Portuguese.

Literature.—French literature proper begins in the 11th century with the epic or

narrative poems known as *chansons de geste*, and produced by the class of poets known as *Trouvères*. These poems belong to northern France and are very numerous. They are usually divided into three heads: poems relating to French history, in particular to the deeds of Charlemagne, his descendants and vassals; poems relating to Alexander the Great and to ancient history; and poems of the Arthurian cycle, or relating to King Arthur. They are generally written in verses of ten or twelve syllables, and are of a length varying from 1000 to 20,000 lines. One of the oldest and best examples of the first class is the Chanson de Roland, or Song of Roland. Of the Arthurian cycle, the Roman de Rou and Roman de Brut; and of the Alexandrine cycle, the Alexandre by Lambert li Cors, and La Guerre de Troie (War of Troy) by Benoît de St. More, are examples. Out of the *chansons de geste* grew the *romans d'aventures*, fictitious poems which are not connected with any of the well-defined topics of the *chansons de geste*. Distinct from these are the *fabliaux*, metrical tales of a witty sarcastic kind, belonging mostly to the 12th or 13th centuries. Allied to these is the Roman de Renard, or History of Reynard the Fox, a poem, or rather series of poems, written between the end of the 12th and the middle of the 14th century, and forming a satirical picture of all the classes and institutions of the time.

Side by side with these epics, romances, and tales, an abundant lyric poetry flourished from the 11th century. This song literature is mainly of a sentimental character, and is usually divided into two classes, *romances* and *pastourelles*. It is in general remarkable for its lyric grace and skilful melody. Amongst the principal of the early lyrists are Thibaut de Champagne (1201–53), Charles of Orleans (1391–1465). The latter, a graceful writer of ballades and rondels, was amongst the last of the real Trouvères. Rutebeuf (born 1230), also a writer of fabliaux, is the first of a series of poets culminating in François Villon who passed their life in a Bohemian alternation of gaiety and misery, celebrating each phase with equal vigour in verse. The Roman de la Rose, the work, in its earlier part, of Guillaume de Loris, who lived in the first half of the 13th century, in the later, of Jean de Meung (died 1320), is one of the most notable productions of the time. It consists of more than 22,000 verses, and is a curious combination of a love poem and a satire. Olivier Basselin (who died about 1418) wrote songs celebrating the praises of wine. François Villon (1431–1500), the greatest of French poets before the Renaissance, wrote two compositions known as the Great and the Little Testament, interspersed with lyrical compositions of great poetic merit.

In prose literature the first important work is the Histoire de la Conquête de Constantinople by Villehardouin (1167–1213). The Mémoires of the Sieur de Joinville (1223–1317) delineates the life of St. Louis and the exploits of the last Crusade. Froissart (1337–1410), the 'Herodotus of his age,' gives a vivid picture of the chivalry of the 14th century. With Philippe de Commines (1445–1509) we are introduced to Louis XI. and his contemporaries in a style of history which, if less naïve and charming, shows a deeper and more philosophical sense of things. In lighter prose the Cent Nouvelles Nouvelles already shows the power of the French language for the short witty tale.

The revival of classical learning and the reformation of religion exercised a powerful influence on the French literature of the 16th century. Rabelais (1483–1553), a profound but often gross humorist, and Montaigne (1533–92), an interesting and instructive, though somewhat sceptical essayist, hold the first rank. Calvin (1509–64) did much by his great theological work, Institution de la religion Chrétienne, to mould French prose in the direction of strength and gravity. Amongst the other works which indicate the rapid development of French prose in this century are Brantôme's Mémoires, the Heptaméron of Queen Margaret of Navarre (1492–1549), the translations by Amyot (1513–93) of Plutarch and other classic writers, and the celebrated political pamphlet, Satire Ménippée. In poetry Clement Marot (1497–1544) gave a new elegance to the language in his epistles and epigrams. Pierre de Ronsard (1524–85) and the other members of the celebrated *Pléiade*, Iodelle, Belleau, Dubellay and others, sought to enrich their native tongue by the introduction of classic words, constructions, and forms of verse. Du Bartas (1544–90) and D'Aubigné (1550–1630) carried on the work of Ronsard. Mathurin Régnier (1573–1613) may be said to close this school of poetry. He unites in himself the lighter qualities of the style of Villon and Marot, with the erudition and command of language characteristic of the Ronsardists. Malherbe (1556–1628), the

creator of a new taste in literature, opposed with success the tendency of the Ronsard school, and falling into the opposite excess sacrificed everything to correctness. It was his school that set the example of the smooth but monotonous Alexandrine. With the Renaissance translations of the classic dramas appeared, and a member of the *Pléiade*, Jodelle (1532–1573), wrote the first regular tragedy (Cléopatre) and comedy (Eugène).

The 17th century opened with Alexandre Hardy (1560–1631), Rotrou (1609–50), Tristan (1601–55), Mairet (1604–88), Du Ryer (1605–48), and a host of other dramatists, for nearly a hundred can be enumerated in the first quarter of the century. At length Pierre Corneille (1606–84), with his Cid, Cinna, Horace, and Polyeucte, brought French tragedy to a degree of grandeur which it has not surpassed. Of seventeenth century prose writers Pascal (1628–62) is vigorous and satirical in his Lettres provinciales; profound, if sometimes mystical, in his Pensées. The letters of Balzac (1584–1684) and Voiture (1598–1648), though rhetorical, were valuable as models for elegant prose. Descartes (1596–1650) showed in his Discours sur la Méthode that the language was now equal to the highest philosophical subjects, and the great work of his disciple, Malebranche, Recherche de la Vérité, is equally admirable for its elegance of style and its subtlety of thought.

The age of Louis XIV. is known as the golden age of French literature. Besides Corneille, Racine (1639–99) represented the tragic drama, and Molière (1639–93) brought his great masterpieces of comedy on the stage. The 'inimitable' La Fontaine (1621–95) wrought his Contes and the most charming collection of fables. For his critical influence, if not for his poetry, Boileau (1636–1711) holds a prominent place. In eloquence the sermons and funeral orations of Bossuet, Bourdaloue, and Massillon take the first rank. Bossuet is also celebrated as a controversialist and theological historian. Very important, too, are the memoir and maxim writers of this time. Amongst the former are the Cardinal de Retz, Madame de Motteville, Madame de Sévigné (1627–96), and others; amongst the latter are La Rochefoucauld (1613–80), St. Evremond (1613–1703), La Bruyère (1639–99). In fiction Le Sage, who also wrote comedies, produced his immortal Gil Blas and the Diable Boiteux; and the versatile Fontenelle wrote his Dialogues des Morts.

Amongst the writers of the 18th century Voltaire holds the first place. He claims notice as an epic, lyrical, and comic poet, as a tragic and comic dramatist, as a historian, novelist, and philosopher, and he remained at the head of the republic of letters for more than half a century. Next to him in immediate influence on the age stands Jean Jacques Rousseau (1712–78), a writer of an eloquent sentimental vein, well represented by his Nouvelle Héloïse and his famous Confessions. His new theories of politics and education are embodied in his Contrat Social and Émile. Buffon (1707–88) devoted himself to the production of his immense natural history. Montesquieu (1689–1755), commencing with the Lettres Persanes, a satire on French manners and government, followed with a historical masterpiece, Considérations sur la Grandeur et la Décadence des Romains, and finally with his great work, the Esprit des Lois. Diderot (1713–83), a powerful and suggestive writer in many departments, and D'Alembert (1717–83), a great geometrician, founded the Encyclopédie, a vast review of human knowledge, often hostile to social order and always to religion. Amongst the philosophers Helvetius, D'Holbach, and La Mettrie represent the extreme materialistic and anti-Christian school. Condillac and Condorcet kept most on the side of moderation. Among the writers of fiction Bernardin de St. Pierre (1737–1814), author of Paul et Virginie, and Prévost (1697–1763), author of Manon Lescaut, are particularly worthy of mention; while dramatic literature was enriched by the Barbier de Séville and the Mariage de Figaro of Beaumarchais (1732–99). The age was not poetical; poetry had degenerated into imitations of foreign descriptive poets, such as Thomson. The most successful writer of this stamp was Delille (1738–1813). André Chénier (1762–94), the most promising of all, fell beneath the guillotine just after completing his Jeune Captive.

Neither the revolution nor the first empire was favourable to literature. Châteaubriand (1768–1848) and Madame de Stael (1766–1817) gave a new turn to the taste and sentiment of the time, the former in his Génie du Christianisme and his Martyres, clothing the history of Christianity in the romantic hues of his imagination, the latter in her Corinne and De l'Allemagne introducing the idealistic spirit and thought of the Germans to her countrymen. A

purely reactionary school of thought was headed by Joseph de Maistre (1754–1821), the advocate of theocracy, with a vigorous despotism for its system of government.

Later on in the present century the influence of Goethe, Schiller, Shakspere, Scott, and Byron began to be felt, and a new school, called the *romantic*, as opposed to the old or *classic*, sprung up, headed by Victor Hugo (1802–85), who promulgated the new theories in the preface to his drama of Cromwell, and carried them into practice in numerous poems. The most notable of his associates were Alfred de Vigny (1779–1863), author of a volume of Poèmes, and of a novel, Cinq Mars; Sainte-Beuve (1804–69), who published several volumes of poetry in those early days, but became famous later on as a critic, perhaps the best France has ever possessed; Alfred de Musset (1810–57), who produced some of the finest lyrics in the language. Charles Nodier, Gérard de Nerval, the two Deschamps, and, later, Théophile Gautier, with others, also belonged to the band of romanticists. On the stage the dramas of Alexandre Dumas, the elder (1803–74), though melodramatic and of inferior literary value, served as rallying points for the new school. To English readers, however, he is best known by his novels. A reactionary movement was attempted, led by Ponsard (1814–67) and Emile Augier (1820–89). Casimir Delavigne (1793–1843) attempted to combine the classic and romantic schools; and Lamartine (1790–1869) is more than half a romanticist by sentiment and style. Béranger (1780–1857), the greatest of French song-writers, may be considered as belonging to neither of the two schools, nor can the sparkling comedies and vaudevilles of Eugène Scribe be claimed by any of the rival parties.

Among novelists, Balzac (1799–1850), by his astonishing series of works, intended to cover the whole ground of human life, has established his claim to the first place. The novels of George Sand (Madame Dudevant, 1804–76), perhaps equally famous, have gained her the reputation of possessing the finest style of any contemporary writer. Low life in Paris was vividly depicted by Eugène Sue (1804–57) in the Mystères de Paris, &c. Of a healthy tone are the novels of Frédéric Soulié, Émile Souvestre, and Edmond About (1828–85), and the stories of the two novelists, conjoined in work as in name, Erckmann-Chatrian. The younger Dumas, Victorien Sardou, Octave Feuillet, Ernest Feydeau, Henri Murger, Gustave Flaubert, have developed a realistic style of novel in which social problems are treated with more candour than delicacy. Of late years a school of writers has arisen who strive to outdo the most realistic of their predecessors. The chiefs of this school are Émile Zola, Émile Gaboriau, Victor Cherbuliez, Alphonse Daudet, &c.

In works of history the century has been very prolific, the leading historians being Michaud (1767–1839), Sismondi (1773–1842), Guizot (1787–1874), Amédée Thierry (1787–1873), Augustin Thierry (1795–1856), Mignet (1796–1884), Thiers (1797–1877), Michelet (1798–1874), Henri Martin (1810–83), Victor Duruy (1811–94), Louis Blanc (1813–82). Literary historians are: Villemain (1790–1870), Vinet (1797–1847), J. J. Ampère (1800–64), Littré (1801–81), St. Marc-Girardin (1801–73), Sainte-Beuve (1804–69), Taine (1828–93), Demogeot. Philosophy is represented by Lamennais (1782–1854), Victor Cousin (1792–1867), Jouffroy (1796–1842), Rémusat (1797–1875), Auguste Comte (1798-1857), Quinet (1803–75), Montalembert (1810–70), Renan (1823–92). Among the writers on political economy and sociology are Bastiat (1801–50), Tocqueville (1805–59), Chevalier (1806–79), Proudhon (1809–65), Jules Simon (1814–96), Prévost Paradol (1829–70). Among scientific writers are: Étienne Geoffroy St. Hilaire and his son Isidore, Cuvier, Jussieu, Duméril, in natural science; Gay-Lussac, Bichat, Corvisart, Magendie, in chemistry and medicine; and Lagrange, Laplace, and Arago in mathematics. Amongst Orientalists of note are Champollion, Burnouf, Silvestre de Sacy, and Stanislas Julien. The essayists and literary and art critics are legion. We can only mention by name Théophile Gautier, Jules Janin, Philarète Chasles, Léon Gozlan, Paul de St. Victor, Gustave Planche, and St. René Taillandier. Amongst poets who belong to a date posterior to the Romantic movement, or show different tendencies, may be mentioned Gautier in his later poetry, Baudelaire (1821–67), Leconte de Lisle, François Coppée, Sully Prudhomme, Catulle Mendes, and the modern Provençal poets, Frédéric Mistral and Théodore Aubanel.

France, Isle of (*Île-de-France*), an ancient province of France, so called because it was originally bounded by the Seine, Marne, Ourcq, Aisne, and Oise, and formed almost an island.

France, Isle of. See *Mauritius*.

Francesca da Rimini (frän-ches'kä dä rē'mi-nē), an Italian lady, daughter of Guido da Polenta, lord of Ravenna, lived in the latter part of the 13th century. She was married to Lanciotto, the deformed son of the lord of Rimini, who, discovering an intimacy between her and his brother Paolo, put them both to death. The story forms an episode in Dante's Inferno, and is alluded to by Petrarch; it is the subject of a poem by Leigh Hunt and a tragedy by Silvio Pellico.

Franche-Comté (fránsh-koṇ-tā), an ancient province of France, forming at present the departments of Doubs, Haute-Saône, and Jura. It formed part of the Kingdom of Burgundy.

Franchise (fran'chīz), in a general and legal sense, a particular privilege or right granted by a prince, sovereign, or government to an individual, or to a number of persons. In politics, in regard to which the term is most commonly used, it is the right of voting upon proposed legislative measures, where such measures are accepted or rejected by the people generally; or for representatives to a legislative assembly (the parliamentary franchise) or to a municipal body.

Francia, Francesco. See *Raibolini*.

Francia, Dr. José Gaspar Rodriguez, Dictator of Paraguay, born about 1758, died 1840. He was for some time a theological professor, and afterwards gained distinction as an advocate at Asuncion. In 1811, when Paraguay threw off the Spanish yoke, he became secretary of the junta appointed by congress. In 1814 he was appointed dictator for three years, and in 1817 he was continued in authority for life. He did much to consolidate the new republic; but his rule was arbitrary in the extreme. In spite of his cruelty and rigour he was generally beloved by his subjects.

Francis I., King of France, was born 1494; died 1547. His father was Charles of Orleans, count of Angoulême, and his mother Louise of Savoy, grand-daughter of Valentine, duke of Milan. He ascended the throne in 1515, having succeeded his uncle, Louis XII. In prosecution of his claim to Milan he defeated the Swiss in the plains of Marignano and forced the reigning duke Maximilian Sforza to relinquish the sovereignty. On the death of Maximilian (1519) Francis was one of the competitors for the empire; but the choice fell on Charles of Austria, the grandson of Maximilian, henceforth known as the Emperor Charles V. From this period Francis and Charles were rivals, and were almost continually at war with one another. Both attempted to gain the alliance of England. With this view Francis invited Henry VIII. of England to an interview, which took place near Calais, between Guînes and Ardres, in June, 1520. The magnificence of the two monarchs and their suites on this occasion has



Francis I.

given to the meeting the name of the Field of the Cloth of Gold. In 1521 war broke out between the rivals, which ended in Francis being defeated and taken prisoner, He could recover his liberty only by renouncing his claims to Naples, Milan, Genoa, and Asti, the suzerainty of Flanders and Artois, and promising to cede the Duchy of Burgundy and some other French fiefs. War was soon after renewed, an alliance, called the Holy League, having been formed between the Pope Clement VII., the King of France, the King of England, the Republic of Venice, the Duke of Milan, and other Italian powers, with the object of checking the advances of the emperor. In this war Rome was taken and sacked by the Constable of Bourbon (1527), and Italy was devastated, but Francis gained little either of fame or material advantage. Peace was concluded in 1529, but hostilities again broke out in 1535, when Francis possessed himself of Savoy. A hastily-made-up peace

was soon broken, and Francis again found himself at war with the Emperor and the King of England. Fortunately for France the union of the Protestant princes of Germany against the emperor prevented him from following up his success, and inclined him to a peace, which was concluded at Crespy in 1544. Charles resigned all his claims on Burgundy, and allowed Francis to retain Savoy. Two years after peace was made with England. Francis I. possessed a chivalric and enterprising spirit, and was a patron of learning.

Francis II., King of France, son of Henry II. and Catharine of Medici, born at Fontainebleau in 1544, ascended the throne on the death of his father, 1559. The year previous he had married Mary Stuart, only child of James V., king of Scotland. The uncles of his wife, Francis, duke of Guise, and the Cardinal of Lorraine, held the reins of government. Francis, who was of a feeble constitution, died in December, 1560.

Francis I., Emperor of Germany, eldest son of Leopold, duke of Lorraine, was born in 1708. In 1736 he married Maria Theresa, daughter of the Emperor Charles VI. After the death of Charles VI. (1740) he was declared by his wife co-regent of all the hereditary states of Austria, but without being permitted to take any part in the administration. After the death of Charles VII. he was elected emperor in 1745. He died in 1765. See *Maria Theresa.*

Francis I., Emperor of Austria (previously Francis II., emperor of Germany), was born 1768, died 1835. He was the son of the Emperor Leopold II. and Maria Louisa, daughter of Charles III., king of Spain. He succeeded his father in 1792. France declared war against him in 1792, and hostilities continued till the Peace of Campo-Formio 1797. In 1799 he entered into a new coalition with England and Russia against the French republic; but in 1801 Russia and Austria were compelled to conclude the Peace of Lunéville. France having been declared an empire in 1804, he assumed the title of *hereditary Emperor of Austria;* and on the establishment of the confederacy of the Rhine in 1806, he renounced the title of Emperor of Germany. In 1805 war again broke out between Austria and France. But after the battle of Austerlitz (1805) the Peace of Presburg was signed. In 1809 he again took up arms against France, and in the Peace of Vienna was compelled to surrender 42,000 square miles of territory. The marriage of his daughter, Maria Louisa, with Napoleon promised to form a strong tie between the imperial houses, but in 1813 he entered into an alliance with Russia and Prussia against France, and was present to the close of the contest.

Francis OF ASSISI, ST., founder of the Franciscans, was born at Assisi, in Umbria, in 1182, where he died in 1226. In youth Francis did not refrain from the pleasures of the world; but after a serious illness he became enthusiastically devout, left the paternal roof, and in 1208 gave himself to a life of the most rigorous poverty. His followers were at first few, but when they reached the number of eleven he formed them into a new order, made a rule for them, and got it sanctioned, though at first only verbally, in 1210, by Pope Innocent III. In 1212 he received from the Benedictines a church in the vicinity of Assisi, which now became the home of the order of the Franciscans or Minorites. Francis afterwards obtained a bull in confirmation of his order, from Pope Honorius III. After an unsuccessful attempt to convert the Sultan Meledin he returned to Assisi, when the order of St. Clara was founded under his direction, and a third order, called the Tertiaries, designed for penitents of both sexes. He was canonized by Pope Gregory IX. in 1228. His festival is on the 4th of October. See *Franciscans.*

Francis OF PAULA, ST., was born in 1416 in the city of Paula, in Calabria; died in France 1507. He was brought up in a Franciscan convent, and in 1436 founded a new order, which, when the statutes were confirmed by Alexander VI., received the name of the *Minims* (Latin, *minimi*, the least). To the three usual vows Francis added a fourth, that of keeping the Lenten fast during the whole year. The fame of his miraculous cures reached Louis XI. of France, who invited him to France, in the hope that Francis would be able to prolong his life. After the death of Louis, Charles VIII. built him a monastery in the park of Plessis-les-Tours and also at Amboise, and loaded him with honour and tokens of veneration. Twelve years after his death he was canonized by Leo X., and the Catholic Church celebrates his festival April 2. See *Minims.*

Francis, PHILIP, poet and dramatist, was born in Dublin 1700, died 1773. Educated at Dublin, he took orders, and kept an academy at Esher, Surrey, where Gibbon was

one of his pupils. He was latterly chaplain to Chelsea Hospital. He is best known from his translations of Horace and other classic authors.

Francis, Sir Philip, one of the many political writers to whom the authorship of Junius's Letters has been ascribed, was the son of the preceding, born in Ireland in 1740, died 1818. In 1773 he went to the East Indies, where he became a member of the council of Bengal, and the constant opponent of Warren Hastings. In 1781 Francis returned to England, and shortly after was chosen member of parliament for the borough of Yarmouth in the Isle of Wight. He took a prominent part in the impeachment of Hastings. He published several political pamphlets. See *Junius*.

Francis'cans are the members of the religious order established by St. Francis of



Franciscan or Gray Friar (Conventual).

Assisi about 1210. They are also called Minorites, or Fratres Minores ('lesser friars'), which was the name given them by their founder in token of humility, and sometimes Gray Friars, from the colour of their garment. The order was distinguished by vows of absolute poverty and a renunciation of the pleasures of the world, and was intended to serve the church by its care of the religious state of the people. The rule of the order destined them to beg and to preach. The popes granted them extensive privileges, and they had an evil repute as spies, frequenting the courts of princes and the houses of noblemen, gentry, &c. Early in the 15th century they split up into two branches, the Conventuals and the Observants or Sabotiers. The former went barefooted, wore a long gray cassock and cloak and hood of large dimensions, covering the breast and back, and a knotted girdle. The Observants wore wooden sandals, a cassock, a narrow hood, a short cloak with a wooden clasp, and a brown robe. In France the members of the order not belonging to any particular sect are called Cordeliers, from the cord which they tie about them. The Capuchins, so called from the peculiar kind of hood or cowl (*capuce*) which they wear, originated in a reform introduced among the Observantists by Matthew of Baschi in the early part of the 16th century, and although it received the approbation of different popes within a short time after its foundation, it did not receive the right of electing a particular general and become an independent order till 1619.

St. Francis himself collected nuns in 1209. St. Clara was their prioress; hence they were called the *nuns of St. Clara*. The nuns were also divided into branches, according to the severity of their rules. The Urbanists were a branch founded by Pope Urban IV.; they revered St. Isabelle, daughter of Louis VIII. of France, as their mother. St. Francis also founded in 1221 a third order, of both sexes, for persons who did not wish to take the monastic vows, and yet desired to adopt a few of the easier observances. They are called Tertiarians or Tertiaries, and were very numerous in the 13th century. From them proceeded several heretical fraternities, as the Fraticelli and Beghards. The whole number of Franciscans and Capuchins in the 18th century amounted to 115,000 monks, in 7000 convents. At the dissolution of the monasteries in England there were sixty-five houses of the Franciscans. The order has given five popes and more than fifty cardinals to the church.

Francis Joseph I., Emperor of Austria and King of Hungary and Bohemia, born 1830; succeeded his uncle, Ferdinand, who abdicated in 1849. The chief events of his reign have been the cession of Lombardy to Italy, as a result of the Austro-French war (1859); and the loss of Venetia, as also Austria's important influence in Germany, the result of the war with Prussia (1866). See the article *Austria*.

Francis-Joseph Land. See *Franz-Joseph Land.*

Francis of Sales, St. See *Sales.*

Francis Xavier, St. See *Xavier.*

Francke (frän'kė), August Hermann, German theologian and philanthropist, born at Lübeck 1663, died at Halle 1727. He was professor of Oriental literature and then of theology at Hallé, but is chiefly known for his successful labours on behalf of poor orphans. In 1695 he founded the famous orphanage at Halle, still known by his name, which now includes, besides the orphan asylum, a great variety of schools, a printing and publishing establishment, chemical laboratory, &c.

Franco-German War of 1870-71. The immediate occasion of this war was an offer made in June, 1870, by General Prim, then at the head of affairs in Spain, of the crown of that country to Leopold of Hohenzollern, a prince belonging to the reigning house of Prussia. The government of Napoleon III. demanded of the King of Prussia that he should forbid the candidature of the prince, and when the prince voluntarily retired from his candidature, still insisted that this renunciation should be formally made by the king, and a guarantee given that the candidature would not be revived. This demand was refused, and a formal declaration of war by France against Prussia was received by Count Bismarck, the Chancellor of the North German Confederation, on the 19th of July. The French were the first in getting their troops to the frontier; but it soon became manifest that instead of being in a complete state of readiness for war, as the minister of war had declared, the French army was defective in almost everything essential to the equipment of an army.

In Germany everything formed a complete contrast to this state of matters. Each section of the army was completely organized in the head-quarters of the district which it occupied in time of peace, and was only sent to the frontiers after being furnished with everything it required. In addition to this Prussia, against which country alone the war had been declared, was not only joined, according to treaty, by all the states of the North German Confederation, but also by those of the South, upon whose neutrality, perhaps even upon whose alliance, Napoleon and the French had counted.

The German forces were divided about the end of July into three armies, one of which, known as the First Army, had its head-quarters at Trèves under General Steinmetz; another of which, known as the Second Army, occupied the Bavarian Palatinate under Prince Frederick Charles; while the Third Army, under the Crown-prince of Prussia, was stationed in Northern Baden. The commander-in-chief of the whole forces was King William of Prussia, who was supported by a staff of general officers, with Von Moltke at their head. The French army, under Napoleon himself, had its head-quarters at Metz, and two advanced divisions were stationed on the borders of France and Germany, the one in the north on the Saar, under General Frossard, the other further south at Weissenburg, under General Douay. The victories of the Third Army, under the crown-prince, at Weissenburg (Aug. 4) and at Wörth (Aug. 6), and of the first and second armies at Forbach (Aug. 6), put the French army in retreat along its whole line, the southern half in the direction of Nancy, and the northern of Metz. The northern army under Bazaine was overtaken by those of Steinmetz and Frederick Charles on the 14th of August, when an engagement at Courcelles took place, in which the Germans were again victorious. This was followed by the battles of Vionville, or Mars-la-Tour, and Gravelotte, the result being that Bazaine withdrew his army under the protection of the fortifications of Metz, which was now surrounded by an army under the command of Prince Frederick Charles.

Meantime the Crown-prince of Prussia had advanced as far as Nancy, and was there awaiting the result of the battles around Metz. He had still the army of MacMahon to deal with, which had now reached Châlons, where it had been reorganized and strengthened to such a degree that the army of the crown-prince was no longer able to cope with it unaided. Accordingly, out of three corps d'armée belonging to the second army, a new army was formed, which was afterwards called the army of the Meuse, and was placed under the Crown-prince of Saxony. About the 20th of August these two armies set out on parallel routes in the direction of Châlons in order to engage the army of MacMahon, which it was expected would now retreat on Paris. Instead of this, however, Count Palikao, minister of war at Paris, issued an order to Marshal MacMahon to strike northwards to the Belgian frontier that he might thence make a de-

scent upon Metz and relieve Bazaine. On the 27th of August, at Buzancy, an advanced detachment of cavalry belonging to the army of the Meuse dispersed a body of French chasseurs, and on the days immediately succeeding a number of engagements and strategic movements ensued, the result of which was that on the 1st of September the army of MacMahon was surrounded at Sedan by a force of overwhelmingly greater numbers, and on the following day both army and fortress surrendered by capitulation. On this occasion 50 generals, 5000 other officers, and 84,000 private soldiers became prisoners of war. Among these was Napoleon III., who was unexpectedly found to have been present with the army of MacMahon. He had a personal interview on the day after the battle with King William of Prussia, who assigned to him Wilhelmshöhe, near Cassel, as his place of residence during his captivity.

One of the first consequences of this defeat was an outburst of rage on the part of the Parisians against the Napoleon dynasty, which on the 4th of September was declared by Gambetta and some members of the corps législatif belonging to the Left to be dethroned. The same members then proclaimed a republic. A government of national defence was formed, at the head of which was placed General Trochu. Meantime France had no available army which was strong enough to stand its ground for an instant before the German armies that were now enabled to continue their march upon Paris. The investment of the city was completed on the 19th of September. It was not till about the beginning of October that the French were able to organize a new army after the loss of that of MacMahon, and by the beginning of November the war in the open field had been resumed in different centres: but the capitulation of Metz with the army of Bazaine (28th Oct.), and that of Strasburg (27th Sept.), had set free for further operations large numbers of German troops, and the utmost efforts of the French could not relieve Paris.

The city had held out for a much longer period than even the most sanguine on the side of the French had at first expected that it would be able to do. Sallies were made at intervals by the garrison (Oct. 12, Oct. 21, &c.; Jan. 13, 14, 15, and 19), but not sufficiently often or in sufficient strength to have any decisive effect. On the failure of the last sally, which took place on the west side from Mont Valérien on the 19th of Jan., it was seen that a capitulation was inevitable. On 21st Feb. M. Thiers, head of the executive, arrived at Versailles along with a diplomatic commission, and preliminaries of peace were signed at Versailles on the 26th of Feb., and accepted by the assembly at Bordeaux on the 1st of March. The principal terms were the following:—1. That France should cede to Germany one-fifth part of Lorraine, including Metz, together with the whole of Alsace except Belfort and the surrounding district. 2. That France should pay to Germany a war indemnity of five milliards of francs (£200,000,000). 3. That certain departments of France should remain in the occupation of the Germans, and should not be fully evacuated until after the payment of the whole indemnity. The definitive treaty of peace, which was signed at Frankfort on the 10th of May, and ratified on the 21st, confirmed in all essential particulars the preliminaries of Versailles. The last instalment of the war indemnity was paid on the 5th of Sept. 1873, and France completely evacuated by the Germans on the 13th of the same month.

François (frän-swä), St., a town in the French West Indies, in the island of Guadeloupe. Pop. about 6000.

Fran'colin, a genus of birds belonging to the same family with the partridge, which they resemble in many respects, though they usually have one or more strong and sharp horny spurs on the tarsi. The only European member of the genus is the *Francolīnus vulgāris*, which is characterized by a red band round the neck, and red feet. It is found in the south of France, Sicily, Cyprus, and the southern part of Europe generally. The other species belong to Africa, Asia, and Oceania.

Franco'nia (in German, *Franken*, so called because early in the 6th century it was colonized by Franks), a district of Germany lying to the east of the Rhine, and traversed by the Main. After the dismemberment of the Carlovingian Empire this district became attached to the German division, and ultimately formed one of the grand-duchies of Germany. In 1806 it was partitioned among Würtemberg, Baden, Hesse-Cassel, the Saxon duchies, and Bavaria. The last received the largest share, now forming the three divisions of Upper, Middle, and Lower Franconia.

Franconian Wines, German wines produced chiefly in the Bavarian district of Lower Franconia. The chief sorts are known as *Leistenwein* and *Steinwein.*

Franc-tireur (fraṅ-tē-rëur), lit. a free shooter: an irregular sharp-shooter, one of a body of soldiers organized in France in the war of 1870, and employed in guerrilla warfare for harassing the enemy, cutting off detachments, &c.

Fran'eker, a town in Holland, in the province of Friesland, on a canal communicating with the sea at Harlingen. It was long celebrated as a school of theology. Pop. 7222.

Frangipani (fran-ji-pä'nē), a perfume invented by the Marquis Frangipani, Maréchal des Armées of Louis XIII. of France. It was a powder composed of every spice then known, with the addition of ground orris-root and musk. It is now a perfume prepared from, or imitating the odour of, the flower of a West Indian tree, *Plumiera rubra,* or red jasmine.

Fran'gulin ($C_6H_6O_3$), a yellow crystallizable colouring matter contained in the bark of the berry-bearing alder (*Rhamnus Frangŭla*). It is a bright-yellow, silky, crystalline mass, without taste or smell, which fuses on heating, and can be sublimed in golden needles. It dyes silk, wool, and cotton.

Frank, the signature of a person possessing the privilege of sending letters free of postage. In Britain the privilege of giving franks for letters was enjoyed within certain limits by all peers, members of parliament, &c., till 1840, when it was abolished by the act which established the penny postage.

Frank'almoigne (-moin), literally 'free alms,' an English mode of tenure according to which a religious corporation held lands without being required to perform any but religious services, such as praying for the souls of the donors. This is the tenure by which almost all the ancient monasteries and religious houses held their lands, and by which the parochial clergy and very many ecclesiastical and eleemosynary foundations hold them to this day, the nature of the service being, upon the Reformation, altered and made conformable to the reformed church.

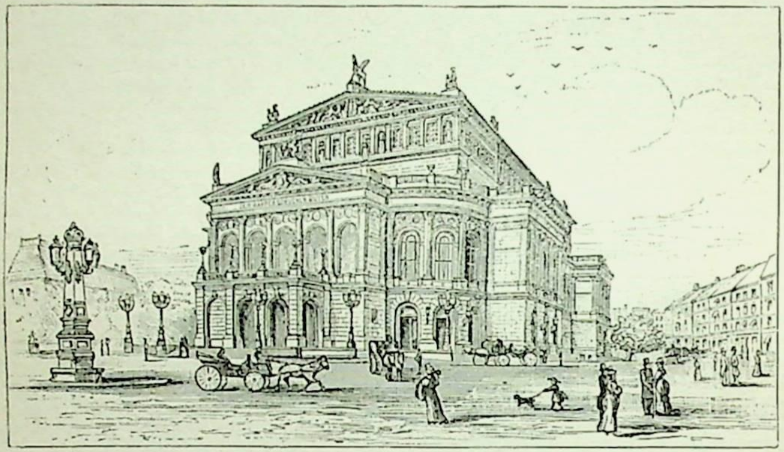
Frank'enberg, a German town, Kingdom of Saxony, 40 miles S.E. of Leipzig. It is regularly built, and has extensive manufactures of woollens, cottons, and silks, &c. Pop. 10,898.

Frank'enstein, a town in Prussia, province of Silesia, 36 miles S.S.W. of Breslau. It has manufactures of cloth, and gunpowder and other mills. Pop. 8017.

Frank'enthal (-täl), a town in Bavaria, in the Palatinate, on a canal near the Rhine, 33 miles S.S.E. of Mainz. It has varied manufactures. Pop. 13,008.

Frankfort-on-the-Main (German, *Frankfurt am Main*), a town of Prussia, in the province of Hessen-Nassau, 20 miles N.E. of Mayence (Mainz). It was formerly a free town of the empire, and down to 1866 one of the free towns of the German Confederation and the seat of the diet. It is mainly situated on the right bank of the Main, but has the suburb of Sachsenhausen on the left bank, the river being crossed by seven bridges. The north or right bank of the river is lined by a spacious quay. The older part of the town contains a number of ancient houses, and largely consists of narrow and unattractive streets, but the principal street, the Zeil, and those of the newer parts of the town, are spacious and have many handsome modern buildings. The older portion is surrounded by the Anlagen or promenade with gardens, on the site of the old fortifications. Fronting this promenade and in the districts outside of it are many very handsome, and some palatial, private residences with gardens. The Römerberg and the Ross-markt (horse-market) are the chief squares in the town. The Römer or town-house was erected about 1405, but not completed in its present form till 1740. In one of its halls, the Wahlzimmer, the electors of the empire met and made their arrangements for the election of the emperor, and the Senate of Frankfort held its sittings. In another, the Kaisersaal, the emperor was banqueted after his election, and waited on at table by kings and princes. The most remarkable of the churches is the Dom or Cathedral of St. Bartholomew (R. Catholic), in which the German emperors after 1711 were crowned. It is a Gothic edifice, begun in 1238. The choir was built in 1315–18. The building was seriously injured by fire in 1867, but has been completely restored, the tower left incomplete since 1514 being finished in accordance with the original plans. Other buildings are the new opera-house, one of the finest buildings of the kind; the courts of justice, of modern construction; the new exchange, a spacious and handsome edifice; the large palace of the Prince of Thurn and Taxis; the new

railway-station, a very elegant edifice, which will favourably compare with any similar structure; the archive-building, post-office, the house in which Luther dwelt, and that in which Goethe was born. There are monuments to Gutenberg, Goethe, Schiller, and others. Frankfort is rich in collections connected with literature and art, and in establishments intended to promote them. The chief of these are the Historical Museum (in the archive-building), the Städel Art Institute (in Sachsenhausen), containing a fine gallery of pictures and other collections; the Senckenberg Museum of Natural History; the town library, possessing over 150,000 printed volumes. There is also a zoological garden and the Palm Garden, both favourite places of resort. The manufactures comprise chemicals, ornamental articles of metal, sewing-machines, straw hats, soap, perfumery, beer, &c. A great business is done in money and banking. The town is provided with tramways, is a great railway centre, and is now reached by the largest



The new Opera-house, Frankfort.

vessels navigating the Rhine. Frankfort dates from the time of Charlemagne. It was made an imperial free city by a decree of the Emperor Louis V. in 1329. Frederick Barbarossa had been elected emperor here in 1152, and in 1356 the right of being the place of election for all future emperors was granted to it by the Golden Bull. Frankfort suffered severely in the Schmalkald war (1552), the Thirty Years' war (1635), the Seven Years' war (1762), and during the French wars (1792, 1796, 1799, 1800, 1806). Under Napoleon it became the capital, first of a principality, and then, in 1806, of a grand-duchy. From 1814 to 1866 it was one of the four free cities of the German Confederation, and in 1866 it was taken by the Prussians. Pop. 229,279 (60 per cent being Protestants).

Frankfort-on-the-Oder (*Frankfurt an der Oder*), a town of Prussia, province of Brandenburg, on the Oder, 52 miles E.S.E. Berlin. It is built with considerable regularity, and is an important military centre. Many retired officers and government officials take up their residence here. The manufactures consist of machinery and metal goods, chemicals, leather, earthenware, spirits, &c.; and the trade is extensive both by land and water. Frankfort was annexed to Brandenburg in 1250, and notwithstanding its repeated captures during the Hussite, the Thirty Years', and the Seven Years' war, was always an important commercial place. Pop. 55,738.

Frank'incense, a name given to the oleo-resinous exudations from different species of conifers. American frankincense is got as a soft, yellow, resinous solid, with a characteristic turpentine odour, from *Pinus Taeda*. Another kind is exuded by the spruce fir, and forms a soft solid, the colour of which varies from white to violet red. From this Burgundy pitch is prepared by melting in

water and straining through a cloth. The frankincense employed in religious ceremonies (called also *incense* and *olibănum*) is a gum-resin obtained from *Boswellia thurifĕra* (or *serrāta*), a tree somewhat resembling the sumach, belonging to the Amyridaceæ, and inhabiting the mountains of India. It comes to us in semi-transparent yellowish tears, or sometimes in masses, of specific gravity 1·22, it possesses a bitter and nauseous taste, and is capable of being pulverized. When burned it exhales a strong aromatic odour, on which account it was much employed in the ancient temples, and still continues to be used in Catholic churches.

Franking Letters. See *Frank*.

Franklin, Benjamin, American writer and statesman, born at Boston Jan. 17, 1706, died at Philadelphia April 17, 1790. He was placed with his brother, a printer, to serve an apprenticeship to that trade, and his brother having started the New England Courant, Franklin secretly wrote some pieces for it, and had the satisfaction to find them well received. But, on this coming to the knowledge of his brother, he was severely lectured for his presumption, and treated with great harshness. Soon after he quitted his brother's employment, and at the age of seventeen started for Philadelphia, where he obtained employment as a compositor. Here he attracted the notice of Sir William Keith, the governor of Pennsylvania, who induced him to go to England for the purpose of purchasing types to establish himself in business. He got work in a printing-office, and after a residence of eighteen months in London returned to Philadelphia. Here he returned to his trade, and in a short time formed an establishment in connection with a person who supplied the necessary capital. They printed a newspaper, which was managed with much ability, and acquired Franklin much reputation. By his exertions a public library, improved systems of education, a scheme of insurance, &c., were established in Philadelphia. In 1732 he published his Poor Richard's Almanack, which continued to be issued till 1757. Being in Boston in 1746 he saw, for the first time, some experiments in electricity, which led him to begin those investigations which resulted in the identification of lightning and electricity, and the invention of the lightning-conductor. As member of the provincial assembly of Pennsylvania he showed himself very active, and he was sent out (in 1757) to the mother country as the agent of the province. His reputation was now such, both at home and abroad, that he was appointed agent of the provinces of Massachusetts, Maryland, and Georgia. Oxford and Edinburgh conferred on him



their highest academical degrees, and the Royal Society elected him a fellow. In 1762 he returned to America; but was again appointed agent in 1764, and brought to England a remonstrance against the project of taxing the colonies. He opposed the stamp-act, and in 1774 presented to the king the petition of the first American Congress. On his return he was elected member of the Congress, and exerted all his influence in favour of the Declaration of Independence. In 1776 he was sent to France as commissioner plenipotentiary, to obtain supplies from that court. After the surrender of Burgoyne he concluded with France the first treaty of the new states with a foreign power (1778), and was subsequently named one of the commissioners for negotiating the peace with the mother country. On his return to his native country he filled the office of president of Pennsylvania, and served as a delegate in the federal convention in 1787, and approved the constitution then formed. His works include his unfinished Autobiography, and a great number of political, anti-slavery, financial, economic, and scientific papers. His personal character as regards morality was by no means high, and he seems to have been of no particular religion.

Franklin, Sir John, an English Arctic voyager, born in Lincolnshire in 1786, died near Lancaster Sound 1847. He entered the navy as a midshipman at the age of fourteen, and was present at the battle of

Copenhagen in 1801. He afterwards accompanied Captain Flinders on his voyage to the coast of Australia (1801–03). Shortly after his return he was appointed to the *Bellerophon*, and had charge of her signals during the battle of Trafalgar. Two years later he joined the *Bedford*, which was employed successively in the blockade of Flushing, on the coast of Portugal, and on the coast of America. On the last station she took part in the attack on New Orleans in 1814, when Franklin was slightly wounded. His arctic work began in 1819, when he conducted an overland expedition for the exploration of the N. coast of America from Hudson's Bay to the mouth of the Coppermine River. On his return to England he published a narrative of the expedition, was promoted to the rank of captain, and elected a F.R.S. In a second expedition he surveyed the coast from the mouth of the Coppermine west to Point Beechy, thus traversing in his two expeditions about a third of the distance between the Atlantic and the Pacific. On his return in 1827 he received the honour of knighthood. After serving for some years in the Mediterranean he held the post of governor of Tasmania from 1836 to 1843. In 1845 he took command of the *Erebus* and *Terror* in what proved his last Polar Expedition. The problem was an arctic water-way between the Atlantic and the Pacific. The expedition was seen in Melville Bay two months later, but from that time no direct tidings were received from it. Many expeditions were sent in search of him both from Britain and America, but with little success. At last an expedition, sent out under M'Lintock in 1857, discovered in 1859, at Point Victory, in King William's Land, a document which had been deposited in a cairn thirteen years before, and gave the latest details of the ill-fated expedition. This paper stated that Sir John died 11th June, 1847; that the ships were abandoned in April 1848; and that the crews, 105 in number, had started for the Great Fish River. None survived, but many relics of the party have been recovered.—ELEANOR PORDON (1795–1825), first wife of Sir John Franklin, published several volumes of verse.—His second wife, JANE GRIFFIN (1802–75), was notable for her philanthropy and her persevering efforts to clear up the fate of her husband.

Franklinite, a mineral composed of oxide of iron 64·5 to 66, oxide of zinc 21·8, and oxide of manganese 12·23 to 13·5, and is therefore considered as belonging to the group of minerals called *spinels*. It is found in New Jersey and named after Dr. Franklin.

Frank-pledge, literally pledge or surety for a freeman. Frank-pledge was a law prevailing in England before the Norman Conquest, by which the members of each decennary or tithing, composed of ten households, were made responsible for each other, so that if one of them committed an offence the others were bound to make reparation.

Franks, a Germanic tribe or aggregate of tribes which overthrew the Roman dominion in Gaul, and gave origin to the name France. See *France*.

Franzensbad (frànts'ens-bàt), a watering-place in Bohemia, about 3 miles north of Eger. The mineral springs are alkaline, saline, and chalybeate, and are very efficacious, particularly in scrofulous and cutaneous affections. Pop. 2000.

Franz-Joseph Land, an island group in the Arctic Ocean, lying north of Nova Zembla, and consisting of two chief islands, much broken up by fiords, and a number of smaller ones.

Frasca'ti, a town, Italy, about 10 miles S.E. of Rome, situated on the slopes of the Alban hills, near the site of the ancient Tusculum. It is much resorted to by the Romans in the summer season. Charles Edward Stuart, the Young Pretender, is buried in the Cathedral of S. Pietro. Pop. about 9000.

Fraser, ALEXANDER CAMPBELL, D.C.L., LL.D., Scottish philosophical writer, born 1819. He succeeded Sir William Hamilton in the professorship of logic and metaphysics at Edinburgh, in 1856, and retired in 1891. From 1850 to 1857 he edited the North British Review, and has published Essays in Philosophy, 1856; Rational Philosophy, 1858; an edition of Bishop Berkeley's works; an edition of Locke's Essay; &c.

Fraser, SIMON. See *Lovat*.

Fra'sera, a genus of plants, nat. order Gentianaceæ, containing seven species of erect perennial herbs, natives of North America. *F. carolinensis* is indigenous in the swamps of the Carolinas. The root yields a powerful bitter, wholly destitute of aroma. In its medicinal effects it is equal to gentian, and when fresh is said to be emetic and cathartic.

Fraserburgh, a seaport of Scotland, in Aberdeenshire, 22 miles east of Banff. It

is substantially built, and has a town-hall, a market-cross, building-yards, and two harbours. Fraserburgh is the chief seat of the Scotch herring-fishery. Pop. 7466.

Fraser River, the principal river in British Columbia, rising in the Rocky Mountains. It first flows north-west for about 270 miles, then turns south, and after a total course of about 500 miles falls into the Gulf of Georgia. Gold is found both on the Fraser and its affluents, and the salmon fisheries are important. Its principal affluents are the Thomson, Quesnelle, and Stuart rivers. New Westminster, Hope, Yale, and Lytton are on its banks.

Frater′cula, a genus of web-footed birds, containing the puffins (which see).

Frater′nity, an association of men who unite to promote their common interest, business or pleasure. In this wide sense it includes all secret and benevolent societies, the monastic and sacerdotal congregations, the orders of knighthood, and also guilds, trades-unions, and the like. In a limited sense it is applied to religious societies for pious practices and benevolent objects. They were often formed during the middle ages, from a desire of imitating the holy orders. Many of these societies, which did not obtain or did not seek the acknowledgment of the church, had the appearance of separatists, which subjected them to the charge of heresy. The pious fraternities which were formed under the direction of the church, or were acknowledged by it, were either required by their rules to afford assistance to travellers, to the unfortunate, the distressed, the sick, and the deserted, on account of the inefficiency of the police, and the want of institutions for the poor, or to perform certain acts of penitence and devotion. Of this description were the Fratres Pontifices, a brotherhood that originated in Tuscany in the 12th century, where they maintained establishments on the banks of the Arno, to enable travellers to cross the river, and to succour them in case of distress. A similar society was afterwards formed in France, where they built bridges and hospitals, maintained ferries, kept the roads in repair, and provided for the security of the highways. Similar to these were the Knights and Companions of the Santa Hermandad (or Holy Brotherhood) in Spain; the Familiars and Cross-bearers in the service of the Spanish Inquisition; the Calendar Brothers in Germany; the Alexians in Germany, Poland, and the Netherlands, &c. The professed object of the Alexians, so called from Alexius, their patron saint, was to visit the sick and imprisoned; to collect alms for distribution; to console criminals, and accompany them to the place of execution; to bury the dead, and to cause masses to be said for those who had been executed, or for persons found dead. There were also Gray Penitents (an old fraternity of an order existing as early as 1264 in Rome, and introduced into France under Henry III.), the black fraternities of Mercy and of Death; the Red, the Blue, the Green, and the Violet Penitents, so called from the colour of their cowl; the divisions of each were known by the colours of the girdle or mantle. The fraternity of the Holy Trinity was founded at Rome in 1548 by Philip de' Neri for the relief of pilgrims and the cured dismissed from the hospitals. The Brothers and Sisters of Charity are another fraternity whose hospitals are found in all the principal cities of Catholic christendom.

Fraticelli (frä-ti-chel′lē; the diminutive plural of Italian, *frate*, brother or monk), the name given about the end of the 13th and during the 14th century, and even later, to wandering mendicants of different kinds, but especially to certain Franciscans, who pretended to practise the rules of their order in their full rigour. They claimed to be the only true church, and denounced the pope, whose authority they threw off, as an apostate. They made all perfection consist in poverty, forbade oaths, and discountenanced marriage, and were accused by their opponents of very lewd practices. The sect is said to have continued till the Reformation, which they embraced.

Frattamaggiore (frät-tä-mä-jō′rā), a town, Italy, 6 miles N.E. of Naples. Manufactures ropes and silk. Pop. 10,951.

Fraud, an act or course of deception deliberately practised with the view of gaining an unlawful or unfair advantage, such as the obtaining of goods under false pretences, and the like. All frauds or attempts to defraud, which cannot be guarded against by common prudence, are indictable at common law, and punishable arbitrarily according to the heinousness of the offence. Every species of fraud which the law takes cognizance of renders voidable every transaction into which it enters as a constituent material element. Fraud may be by false representation, concealment of material circumstances that ought to be revealed, un-

derhand dealing, and by taking advantage of imbecility or intoxication. A constructive fraud in law is such fraud as is involved in an act or contract which, though not originating in any actual evil or fraudulent design, yet has a tendency to deceive or mislead other persons, or to violate public or private confidence, or to impair or injure the public interests. The *Statute of Frauds* was the statute 29 Charles II. c. 3, passed 1677. Among its complex provisions it provided that various transactions should be in writing, or evidenced by some memorandum in writing, signed by the party who is sought to be made liable thereon; else they shall, for most or all purposes, be deemed invalid.

Fraunhofer (froun'hō-fėr), JOSEPH VON, German optician, born 1787, died 1826. He ultimately became a partner in a manufactory of optical instruments at Munich. His many improvements in glass-making, in optical instruments, and in the polishing of lenses, have been eclipsed by his investigation of the innumerable dark fixed lines in the solar spectrum, known as *Fraunhofer's Lines*. The importance of this discovery can scarcely be overestimated. It led to the invention and use of the spectroscope, to the science of spectroscopy, and to all our present knowledge of solar and stellar chemistry. See *Spectrum*, *Spectroscope*, &c.

Fraustadt (frou'stát), a town of Prussia, in the government of Posen, 15 miles north-east of Glogau. Pop. 7378.

Fraxinella, a species of dittany, the *Dictamnus Fraxinella*, an ornamental herbaceous annual plant, cultivated for its fragrant leaves and handsome rose-coloured flowers.—*Dictamnus albus*, or common dittany, is also called fraxinella; its flowers are white.

Frax'inus, a genus of deciduous trees of the order Oleaceæ, containing the ash.

Fray Bentos (frī), a small town of Uruguay, on the river Uruguay, about 170 miles north-west of Monte Video. It owes its existence to immense slaughter-houses and other establishments connected with the extract-of-meat trade. Pop. about 2500.

Frechette (frė-shet'), LOUIS HONORÉ, a French Canadian author, born at Levis, Quebec, 1839. He was educated at Nicolet College and Laval University, studied law and was called to the bar of Lower Canada, represented his native county in the Dominion parliament (1874–79), contributed to various newspapers, and became editor of La Patrie in Montreal in 1884. He has published collections of poems entitled Mes Loisirs, Les Fleurs Boréales and Les Oiseaux de Neige (the two last crowned by the French Academy); the dramas of Félix Poutré (1862), Papineau (1880), The Thunderbolt (1882), &c. In prose he has written Petite Histoire des Rois de France, Lettres à Basile, &c.

Freckles are small yellow or greenish-yellow spots of a circular form, situated in the middle layer of the skin and underneath the cuticle. They only appear to any appreciable extent on those surfaces exposed to the action of the sun, as the neck, face, hands, and arms. This affection is most common in persons of fair complexion and hair; in some cases it is permanent, but in most it disappears with the warm season.

Fredegonde, the wife of Chilperic, a Frankish king of Neustria, born 543, died 597. While in the service of the first and second wives of Chilperic her beauty captivated the king. In order to arrive at the throne Fredegonde got Andowena, the first wife of the king, removed by artifice, and the second (Galswintha) by assassination (568). This led to a war between Chilperic and his brother Sigebert, king of Austrasia, Brunehilde, wife of Sigebert and sister of the murdered queen, urging her husband to vengeance. Fredegonde found means to have Sigebert assassinated, took Brunehilde and her daughters, and after a series of crimes, ending with the assassination of her husband, she seized the reins of government on behalf of her son Clothaire, and retained possession of them until her death.

Fredericia, a seaport and fortress of Denmark, in Jutland, at the north entrance of the Little Belt. In 1849 the army of Schleswig-Holstein was defeated here by the Danes, and in 1864 the Danes were compelled to evacuate it before the superior Austro-Prussian forces. Pop. 8275.

Frederick, a town in the United States, in Maryland, 44 miles N.W. of Baltimore. It has an extensive trade, chiefly in live stock, grain, flour, tobacco, wool, &c. During the civil war it was occupied on different occasions by the opposing armies. Pop. 8193.

Frederick I., BARBAROSSA (or, as the Germans call him, ROTHBART, both surnames meaning 'Red-beard'), German emperor, son of Frederick, duke of Suabia, was born 1121, and received the imperial crown in 1152 on the death of his uncle the Emperor

Conrad III. His principal efforts were directed to the extension and confirmation of his power in Italy. In his first expedition to Italy in 1154 he subdued the towns of Northern Italy, and then got himself crowned at Pavia with the iron crown of Lombardy (April 1155), and afterwards at Rome by Pope Adrian IV. with the imperial crown (June 1155). Soon after his return to Germany the Lombard cities revolted, and Frederick led a second expedition into Italy (1158), took Brescia and Milan, and at the diet of Roncaglia, at which all the cities and imperial vassals of Italy were represented, he assumed the sovereignty of the towns and received the homage of the lords. The rights assigned to the empire were so great that many of the cities refused to acknowledge them, and Milan especially prepared for resistance. Meantime Pope Adrian IV. died (1159), and in electing a successor the cardinals were divided, one section choosing Victor IV. and another Alexander III. Frederick supported Victor, and Alexander was compelled to flee from Italy and take refuge in France. Other expeditions into Italy were made in 1161 and 1166, in the latter of which Frederick at first carried everything before him, and was even able to set up in Rome the Anti-pope Paschalis III., whom he supported after the death of Victor IV. His successes were put an end to, however, by a terrible pestilence, which carried off a large part of his army, and compelled him hastily to return to Germany. Scarcely had he settled the most pressing difficulties here when he undertook, in 1174, a fifth expedition into Italy; but he was totally defeated in the battle of Legnano on the 29th of May, 1176, in consequence of which nearly all that he had won in Italy was again lost, and he was compelled to acknowledge Alexander III. as the true pope. In 1188 he assumed the cross, and with an army of 150,000 men and several thousand volunteers set out for Palestine. After leading his army with success into Syria he was drowned in crossing the river Kalykadnus (new Selef), 1190.

Frederick II., Hohenstaufen, grandson of the preceding, born 1194, was son of the Emperor Henry VI. and of the Norman Princess Constance, heiress of the Two Sicilies. He remained under the guardianship of Innocent III. till 1209, when he took upon himself the government of Lower Italy and Sicily. The imperial crown of Germany was now worn by a rival, Otho IV., whose defeat at the battle of Bouvines opened the way to Frederick, who in 1215, after pledging himself to undertake a crusade, was crowned at Aix-la-Chapelle. He caused his eldest son Henry to be chosen king of Rome in 1220, and the same year received the imperial crown from the pope. His ambition aimed at the subjugation of Lombardy, the mastership of all Italy, and the reduction of the popes to their old spiritual office as the leading bishops in Christendom. This led him into constant struggles in Germany and Italy. In 1227 he undertook a crusade; but when he did reach the Holy Land he was able to effect nothing permanent, although he had crowned himself at Jerusalem as king of Judea. On his return he had to suppress a revolt of his son Henry, whom he imprisoned for life. In 1237 he broke the power of the Lombard League by a victory at Corte Nuova in Lombardy, and marched on Rome, but did not attack it. The remainder of his life was occupied with his troubles in Italy, and he died in the midst of his wars in 1250. He was one of the ablest and most accomplished of the long line of German emperors, and art, literature, commerce, and agriculture received every encouragement at his hands. He himself was a good linguist, was acquainted with natural history, was a minnesinger, and a writer on philosophy.

Frederick I., King of Prussia, son of the great elector, born 1657, died 1713. He succeeded his father as Elector of Brandenburg in 1688; became King of Prussia in 1700; and was all his reign bitterly opposed to France.

Frederick II., King of Prussia, known as Frederick the Great, born 1712, died 1786. He was the son of Frederick William I., and the Princess Sophia Dorothea of Hanover, sister of George II. of England. Although he was instructed only in the details of military exercises and service, his taste for poetry and music was early developed. He was brutally treated by his father, and in 1733 he was obliged to marry the Princess Elizabeth Christina, daughter of Ferdinand Albert, duke of Brunswick-Bevern. Frederick William gave the castle of Schönhausen to her, and to the prince the county of Ruppin, and in 1734 the town of Rheinsberg, where he lived, devoting himself chiefly to literary pursuits, composing several works, and corresponding with foreign scholars, particularly with Voltaire, whom he greatly admired. The death of his father

raised him to the throne in 1740, and it was not long before he asserted the claims of the house of Brandenburg to a part of Silesia then held by Maria Theresa. But his proposals being rejected, he occupied Lower Silesia in December 1740, defeated the Austrians near Mollwitz, and at Czaslau (Chotusitz), and the first Silesian war was terminated by the peace signed at Berlin July 28, 1742, leaving Frederick in possession of Silesia. Soon the second Silesian war broke



Frederick the Great.

out, the result of which was equally favourable for Frederick. By the Peace of Dresden (December 15, 1745) he retained Silesia and acknowledged the husband of Maria Theresa, Francis I., as emperor. During the eleven following years of peace Frederick devoted himself to the domestic administration, to the improvement of the army, and at the same time to the muses. He encouraged agriculture, the arts, manufactures, and commerce, reformed the laws, increased the revenues of the state, and perfected the organization of his army, which was increased to 160,000 men. Secret information of an alliance between Austria, Russia, and Saxony gave him reason to fear an attack and the loss of Silesia. He hastened to anticipate his enemies by the invasion of Saxony (1756), with which the Seven Years' war, or third Silesian war, commenced. This was a far more severe struggle than either of the former. In it Frederick had against him Austria, Russia, France, Sweden, and greater part of Germany, though Britain and some of the German states were on his side. He gained victories at Prague, Rossbach, Leuthen, Zorndorf, Torgau, Freiberg, but suffered severe defeats in the battles of Kollin, Hochkirch and Kunersdorf. (See *Seven Years' War.*) The Peace of Hubertsburg (1763) terminated this war, Frederick keeping Silesia and ceding nothing. Frederick came out of the Seven Years' war with a reputation which promised him, in the future, a decisive influence in the affairs of Germany and Europe. His next care was the relief of his kingdom, drained and exhausted by the contest. This he prosecuted with great diligence and liberality. On the partition of Poland in 1772 Frederick received a large accession to his dominions. In 1778–79 he frustrated the designs of the Emperor Joseph II. on Bavaria, and the war of the Bavarian Succession was terminated without a battle by the Peace of Teschen (May 13, 1779). Austria consented to the union of the principalities of Franconia with Prussia, and renounced the feudal claims of Bohemia to those countries. In the evening of his active life Frederick concluded, in connection with Saxony and Hanover, the confederation of the German princes, July 23, 1785. An incurable dropsy hastened the death of Frederick, who left to his nephew, Frederick William II., a kingdom increased by 29,000 square miles, a well-filled treasury, an army of 200,000 men, great credit with all the European powers, and a state distinguished for population, industry, wealth, and science. Frederick's works, relating chiefly to history, politics, military science, philosophy, and the belles-lettres, were all written in French, the language which he regularly used, as he despised German. He was a man of the highest abilities, but in some respects narrow and repellant. Among his closest friends was the Scottish exile Marshal Keith. Carlyle's History of Frederick is well known.

Frederick III., Emperor of Germany, born 1831; succeeded William I. March 9, 1888; died June 15, 1888. In 1858 he married the Princess-Royal of Britain, eldest daughter of Queen Victoria. He commanded the army of the Oder in the war with Austria (1866), and in the Franco-German war he led the army which ultimately forced Napoleon III. and his army to surrender at Sedan. He also took a prominent part in the siege of Paris. In 1887 he was attacked by a serious throat affection, which turned out to be of a cancerous character, and which after a series of relapses proved fatal. His renown as a military commander, his liberal views, his pa-

tience and fortitude under trouble, and his many lovable qualities made him extremely popular.

Frederick Augustus II. and **III.**, electors of Saxony and kings of Poland. See *Augustus*.

Frederick Charles, Prince, known as the 'Red Prince,' born 1828, died 1885. He was nephew to the Emperor William I., and gained fame for his military exploits during the wars of 1866 and 1870. Sadowa, Thionville, Gravelotte, and St. Privat are among his chief achievements.

Fredericksburg, a town, United States, Virginia, on the Rappahannock, 60 miles north by east of Richmond. Here the Federal forces under Burnside were defeated by the Confederates under Lee on the 13th Dec. 1862. Pop. 4528.

Frederickstad, a town of Norway, at the mouth of the Glommen, 48 miles S.E. of Christiania. Formerly strongly fortified; it has an arsenal; manufactures hardware, pottery, &c., and has some shipping and general trade. Pop. 11,259.

Frederick William, of Prussia, generally called the *Great Elector*, was born in 1620, died 1688. At the age of twenty he succeeded his father as elector of Brandenburg. He must be considered as the founder of the Prussian greatness, and as the creator of a military spirit among his subjects. His reign began when the unhappy Thirty Years' war was still raging in Germany, and his conduct towards both parties was prudent. He succeeded in freeing Prussia from feudal subjection to Poland; and obtained possession of Pomerania in 1648. In 1672 he concluded a treaty with the Dutch Republic, when this state was threatened by Louis XIV. In 1673 he concluded a treaty by which France promised to evacuate Westphalia, and to pay 800,000 livres to the elector, who, in return, broke off his treaty with Holland, and promised not to render any aid to the enemies of France. In 1674 the German Empire declared war against France. The elector marched 16,000 men into Alsace, but a Swedish army having been induced to invade Prussia, Frederick turned back and totally defeated them at Fehrbellin (1675). Some years after the Swedes again invaded his territories, but were driven back. France, however, demanded the restoration of all the conquered territories to Sweden. The elector, having refused compliance, formed an alliance with Denmark, and waged a new war against Sweden, but was at last obliged to submit. He paid great attention to the promotion of agriculture and horticulture, and, by affording protection to the French refugees, gained 20,000 industrious manufacturers, who were of the greatest advantage to the north of Germany. Berlin was much improved during his reign. He left to his son a country much enlarged and improved, an army of 28,000 men, and a well-supplied treasury.

Frederick William I., King of Prussia, son of Frederick I. and father of Frederick the Great (II.), was born in 1688, died 1740. While crown-prince (1706) he married Sophia Dorothea, daughter of the Elector of Hanover, afterwards George I. of England. On his accession to the throne, in 1713, he endeavoured to increase the army and reform the finances, and became the founder of the exact discipline and regularity which have since characterized the Prussian soldiers. He was very miserly, eccentric, and arbitrary. He opposed Charles XII., and was the protector of the neighbouring Protestant states. His ridiculous fondness for tall men is well known. He left behind him an abundant treasury, and an army of about 70,000 men. His affairs were in the greatest order and regularity, and to his energy Prussia was much indebted for that prosperity and success which distinguished her till she was humbled by the power of Napoleon.

Frederick William II., King of Prussia, born 1744, died 1797. He succeeded his uncle Frederick the Great in 1786, and shared in the second partition of Poland.

Frederick William III., son of Frederick William II., born 1770, died 1840. During his reign Prussia suffered much at the hands of Napoleon, including defeats at Jena, Eylau, Friedland, &c., and lost a large portion of territory, which, however, was recovered after the fall of Napoleon.

Frederick William IV., King of Prussia, son of Frederick William III., was born 1795, died 1861. He was carefully trained by the best masters in all the leading branches of knowledge and art, civil and military. He took part, though without any active command, in the campaigns of 1813–14. When he succeeded to the throne by the death of his father in 1840 his first proceedings were both of a popular and praiseworthy character. He soon, however, began to pursue a retrograde and absolutist policy. The popular movement which followed the French revolution of 1848 was at

first met by the king with firmness, but on the demand of the people that the troops should be withdrawn from the capital, backed by an attack on the arsenal, the king offered concessions, which, however, he retracted on his power becoming more secure. Latterly his mind gave way, and he sank into a state of hopeless imbecility, which rendered it necessary to appoint his brother William regent of the kingdom. He died without issue, and was succeeded by his brother, who ten years later became emperor of united Germany.

Fredericton, the capital of New Brunswick, Dominion of Canada, on the river St. John, about 84 miles from its mouth, and 54 miles N.N.W. of the town of St. John. It is well laid out, and has handsome public buildings, including the government house, the provincial buildings, court-house, town-hall, cathedral, university, &c. The trade is extensive and increasing, the river being navigable for large steamers. Pop. 6502.

Fred'erikshald, or FREDERIKSHALL, a seaport, Norway, at the mouth of the Tistedal in the Idde-fiord, about 60 miles S.S.E. of Christiania. Immediately to the south stands the fortress of Frederiksteen, at the siege of which Charles XII. of Sweden was killed, 30th November, 1718. An obelisk marks the spot. Pop. 11,237.

Free-bench, in law, the right which a widow has, in some parts of England, in her husband's copyhold lands, corresponding to dower in the case of freeholds.

Free Church of England, an Episcopal body separate from the Established Church of England, founded in 1844 as a counteracting movement to the tractarian movement. The churches belonging to it, though not numerous, are widely spread. The service is practically identical with that of the Evangelical party of the national church. The church is governed by convocation and three bishops.

Free Church of Scotland, a Presbyterian church organized as a separate body from the Established Church in May, 1843. The Queen Anne Act of 1712, which restored patronage in Scotland, was for long the chronic cause of schism and discontent in the Scottish church, unwelcome clergymen being often under it appointed to church livings. In 1834 the General Assembly passed a *veto act*, which declared that no minister should be intruded into a parish church against the will of the people, and that a majority of male heads of families, full members of the church, should be able to bar an obnoxious presentee. This act before long created litigation, and the ecclesiastical and civil powers came into conflict. The struggle was brought to an issue by the judgment of the House of Lords in 1842, affirming a decree of the Court of Session, which required the presbytery of Auchterarder to induct the presentee to Auchterarder parish without regard to the dissent of the parishioners. In May, 1843, the members of the General Assembly had been elected and were convened at Edinburgh, when the Rev. Dr. David Welsh, who had been moderator of the last Assembly, instead of constituting the meeting in the ordinary manner, rose and read a protest, pointing out that the civil courts had undue powers of interference with the Established Church, and concluding by asserting the right of the protesters, in the circumstances, to withdraw to a separate place of meeting for the purpose of taking steps on behalf of themselves and their adherents for separating in an orderly way from the Establishment, but still maintaining the Confession of Faith and Standards of the Church of Scotland as heretofore understood. After reading this document the moderator and other members of Assembly, together with those adhering to them, withdrew to another place of meeting (the Tanfield Hall, Canonmills), and constituted themselves the Free Church of Scotland. They elected Dr. Chalmers as their moderator, and proceeded with the business before them. Although thus denuded of the temporal benefits of an establishment, they declared themselves to be the true national church of the Reformation, and did not object to the endowment and establishment of religion by the state. In late years, however, the majority of the Free Church clergy have given up the doctrine of the lawfulness of the establishment of the church by the state, and become converts to the 'voluntary principle.' The deed of demission, or resignation of livings, was signed by 474 ministers and professors. A sustentation fund was instituted for the maintenance of the ministers, to be supplied by the voluntary offerings of the people. In the first year after the disruption the sum of £366,719 was contributed for the erection of churches, between 700 and 800 of which had to be provided for congregations which left the Establishment with their ministers. Colleges for the theological training of the ministry were subsequently erected in Edinburgh, Glasgow, and Aberdeen. Schools

were added to the churches in town and country, and normal schools for the training of teachers were instituted in Edinburgh and Glasgow. In 1876 the Reformed Presbyterian Church was united with the Free Church, and in 1900 the Free and the United Presbyterian Churches joined together to form the United Free Church of Scotland.

Free Cities, cities having an independent government of their own, and virtually forming states by themselves; a name given to certain cities of Germany which were members of the German Confederation, and exercised sovereign jurisdiction within their own boundaries. At the time of the French Revolution the free or 'imperial' cities numbered no fewer than fifty-one; but with the exception of Hamburg, Lübeck, and Bremen, they have all been deprived of their privileges as the result of various political changes.

Free Companies, FREE LANCES, names given to the troops of private adventurers, who, in the middle ages, organized themselves into bands of mercenary soldiers, and let out their services to the highest bidder. They played their most conspicuous part in Italy, where they were called *Condottieri*.

Free Congregations (Ger. *Freie Gemeinden*), sometimes called 'Protestant Friends,' a sect of German Rationalists, who at first professed to be Christians, but now reject the doctrines of miraculous revelation and a personal deity. There are upwards of 120 congregations of them in Germany, and a few in the United States.

Freedmen (*liberti*, *libertini*) was the name applied by the Romans to those persons who had been released from a state of servitude. The freedman wore a cap or hat as a sign of freedom (hence the origin of the cap of liberty), assumed the name of his master, and received from him a white garment and a ring. With his freedom he obtained the rights and privileges of a Roman citizen of the plebeian rank, but could not be raised to any office of honour.

Freehold, in law, an estate in real property, held either in fee-simple or fee-tail, in which case it is a freehold of inheritance, or for the term of the owner's life; also, the tenure by which such an estate is held.

Free Lances. See *Free Companies*.

Free Libraries. See *Libraries*.

Freeman, EDWARD AUGUSTUS, English historian and archæologist, born 1823, educated at Trinity College, Oxford, of which he was scholar and fellow; died in 1892. He received various academical distinctions, and in 1884 became Regius professor of modern history at Oxford. His works, which are very voluminous, include History of Architecture, 1849; History and Conquests of the Saracens, 1856; History of Federal Government, 1863; Old English History, 1869; Growth of the English Constitution, 1872; Historical Essays, 1872–79; History of the Norman Conquest, 1867–76; Historical Geography of Europe, 1881; the Reign of William Rufus, 1882; History of Sicily (unfinished), 1891–92; &c.

Freemasonry, a term applied to the organization of a society calling themselves *free* and accepted *masons*, and all the mysteries therewith connected. This society, if we can reckon as one a number of societies, many of which are unconnected with each other, though they have the same origin and a great similarity in their constitution, extends over almost all parts of the globe, and is consequently of the greatest service to travellers who are members of the craft. According to its own peculiar language it is founded on the practice of social and moral virtue. It claims the character of charity in the most extended sense; and brotherly love, relief, and truth are inculcated in it. Fable and imagination have traced back the origin of freemasonry to the Roman Empire, to the Pharaohs, the temple of Solomon, the Tower of Babel, and even to the building of Noah's ark. In reality it took its rise in the middle ages along with other incorporated crafts. Skilled masons moved from place to place to assist in building the magnificent sacred structures—cathedrals, abbeys, &c.—which had their origin in these times, and it was essential for them to have some signs by which, on coming to a strange place, they could be recognized as real craftsmen and not impostors. Freemasonry in its modified and more modern form dates only from the 17th century. The modern ritual is said to have been partly borrowed from the Rosicrucians and knights templars, and partly devised by Elias Ashmole, the founder of the Ashmolean Museum. Freemasonry, thus modified, soon began to spread over the world. In 1725 it was introduced into France by Lord Derwentwater; and in 1733 the first American lodge was established. The United Grand Lodge of England recognizes only two species of Freemasonry—the *Craft* and the *Royal Arch;* Scotch, Irish, American, and Continental lodges acknowledge higher degrees; but these, with the exception of the *Mark*

Degree, are not universal. In ordinary freemasonry there are three grades—those of apprentice, fellow-craft, and master-mason—each of which has its peculiar initiatory ceremonies; the last of these grades, however, is necessary to the attainment of the full rights and privileges of brotherhood.

Free Port, a harbour where ships of all nations may enter on payment of a moderate toll, and load or unload. Goods may be stored at first at free ports without paying any duty; the goods may then be either reshipped for export on paying a mere transit duty, or they may be admitted for home consumption on payment of the usual full customs of the country.

Freeport, capital of Stephenson co., Illinois, 120 miles W. by N. of Chicago; the seat of a Presbyterian college, and manufactures machinery, carpets, &c. Pop. 10,189.

Free Spirit, BRETHREN OF THE, a sect of heretics which originated in Alsace in the 13th century, and quickly became disseminated over Italy, France, and Germany. They claimed 'freedom of spirit,' and based their claims on Rom. viii. 2–14: 'The law of the spirit hath made me free from the law of sin and death.' Thence they deduced that they could not sin, and lived in open lewdness, going from place to place accompanied by women under the name of 'sisters.'

Freestone. See *Sandstone.*

Freethinkers, an epithet applied to the English Deists of the 17th and 18th centuries who argued for natural as against revealed religion. Anthony Collins (who first made it a name of a party by his Discourse of Free-thinking, London, 1713), and his friend, John Toland, are among the chief of the early freethinkers. Another able writer on the same side was Math. Tindal (died 1733), whose Christianity as Old as the Creation (1730) caused a great sensation. Lord Bolingbroke and Hume take the lead among advanced freethinkers. In France Voltaire and the encyclopedists D'Alembert, Diderot, and Helvetius led the opposition against revealed religion. The same spirit became fashionable in Germany in the reign of Frederick the Great. The term is now generally applied to designate Rationalists in general, who are to be found among Christians as well as non-Christians.

Freetown, a seaport, West Africa, capital of the British settlement of Sierra Leone, not far from the entrance of the estuary or river of Sierra Leone, in the vicinity of extensive swamps, which make it very unhealthy. Its principal streets are broad and straight, and have a very attractive appearance. Among the public buildings are several churches, a governor's house, and barracks. Pop., mostly liberated negroes, 18,000.

Free-trade, the term applied to national commerce when relieved from such interference as is intended to improve or otherwise influence it; that is, unrestricted by laws or tariffs, and not unduly stimulated by bounties. In all countries it was long held to be of importance to encourage native production and manufactures by excluding from their own markets, and from the colonial markets over which they had control, the competing produce and manufactures of other countries. On this theory the great body of British commercial legislation was founded until 1846, when the policy of free-trade was introduced in grain, and afterwards gradually extended by the repeal of the navigation laws in 1849 and other great measures, until nearly all British commercial legislation has been brought into conformity with it. Free-trade can hardly yet be said to have been adopted as a principle of commercial policy by any nation except Great Britain. As an economic principle free-trade is the direct opposite to the principle or system of *protection*, which maintains that a state can reach a high degree of material prosperity only by protecting its domestic industries from the competition of all similar foreign industries. To effect this protecting countries either prohibit the importation of foreign goods by direct legislation, or impose such duties as shall, by enhancing the price, check the introduction of foreign goods. The advocates of what is called *fair trade* in Britain profess a preference for free-trade were it universal or even common; but seeing that Britain is almost the sole free-trade country in the world, declare that a policy of reciprocity is required for the protection of British traders and manufacturers. The progress made by Britain since 1846 is adduced as a striking proof of the wisdom of a free-trade policy, even without reciprocity.

Free-will, the power of directing our own actions without constraint by necessity or fate, a doctrine maintained in the fields both of theology and of metaphysics. See *Will.*

Freezing, CONGELATION, or SOLIDIFICATION, the transformation of a liquid into a solid under the influence of cold. Each liquid always solidifies at the same temperature, which is called its freezing-point, and

the solid also melts again at the same temperature. Thus the freezing-point and the melting-point, or point of fusion, are the same, and the point is always the same for the same substance. Consequently the freezing-point of water, or the melting-point of ice (32° Fahr.), is taken for one of the fixed points in thermometry. The freezing-point of mercury is 39° below zero, of sulphuric ether 46° below zero, of alcohol 203° below zero Fahr. It has been shown that the increase of pressure upon water, and upon all substances which expand in freezing, will lower the freezing-point; and that such substances as wax, spermaceti, sulphur, and paraffin, which contract in freezing, have the freezing-point raised by pressure. Artificial freezing is attained by the liquefaction of solids or the evaporation of liquids. These processes absorb heat, and by abstracting it from the surrounding substances freeze the latter. Among freezing-mixtures are: (1) two parts of pounded ice or fresh snow and one part of common salt, which causes the thermometer to fall to $-4°$; (2) equal parts of water, of powdered crystallized nitrate of ammonia, and of powdered crystallized carbonate of soda, which produces a cold of $-7°$; (3) three parts of snow with four parts of crystallized chloride of calcium, producing a temperature of $-54°$; while (4) with a mixture of liquid nitrous oxide and carbon disulphide a temperature of $-220°$ is reached.

Freiberg (frī'ber*h*), a German mining town, the centre of the mining district of Saxony, 20 miles W.S.W. of Dresden, near the Mulde. There are still remains of its former walls, towers, and ditches, but their site has mostly been converted into a promenade. The principal buildings and establishments are the cathedral, the mining academy with a museum attached, the town-house, the castle (now a military magazine), the royal silver refinery, &c. The Freiberg district yields silver, copper, lead, and cobalt. Pop. of town 27,042.

Freiburg (frī'bụr*h*), or FREIBURG IM BREISGAU, a town of Baden, on the Dreisam, 42 miles S.S.E. of Strasburg. It consists of the town proper, still possessing some remains of fortifications, and of two suburbs. The chief buildings are the cathedral, a large and beautiful Gothic structure, with a fine portal richly sculptured, and surmounted by a tower with a spire of exquisite open work 380 feet high; the Ludwigskirche; the university, founded in 1456; the museum, theatre, grand-ducal palace, &c. The manufactures are numerous, but not individually of great extent. Pop. 48,788.

Freiburg, a canton and town of Switzerland. See *Fribourg*.

Freienwalde (frī'en-väl-de), a town of Prussia, district of Potsdam, with a chalybeate spring and bathing establishment in the vicinity. Pop. 6819.

Freight, the sum paid by a merchant or other person hiring a ship or part of a ship, for the use of such ship or part during a specified voyage, or for a specified time; also any sum charged for the transportation of goods.

Freiligrath (frī'li*h*-rät), FERDINAND, German lyric poet, born at Detmold 1810; died at Cannstadt, in Würtemberg, 1876. In 1838 he published at Mainz a volume of his collected poems, which proved successful and gained him a pension, which he relinquished on the publication of his Glaubensbekenntnis (Confession of Faith), the republican character of which caused his prosecution and flight to London. He returned to Germany in 1848 and took part in the revolutionary movements, publishing the political poems Die Revolution, Februarklänge, and Die Todten an die Lebenden. The last of these led to his being put on trial for treason. This trial, in which he was acquitted, is memorable for another reason, being the first jury trial ever held in Prussia. From 1851 till 1867 Freiligrath again resided in England, but his last years were spent at Cannstadt. Many of his songs are yet very popular. Germany is indebted to him for many admirable translations from foreign languages, as from Burns, Tannahill, Moore, Hemans, Shakspere, Longfellow, and Victor Hugo.

Freising (frī'zing), a town of Bavaria, on the left bank of the Isar, 21 miles N.N.E. of Munich. It has a fine old cathedral church. Pop. 8850.

Fréjus (frā-zhüs; ancient *Forum Julii*), a town, France, dep. Var, on the Mediterranean, 45 miles N.E. of Toulon. Among its Roman antiquities are the remains of a port, quays, and lighthouse, a triumphal arch, an amphitheatre, and aqueduct. Pop. 3050.

Fremont, an American city, capital of Sandusky co., Ohio. It has a considerable trade, lines of steamers running from the city, which stands at the head of steam navigation on the river Sandusky, to the principal ports of Lake Erie. Pop. 7141.

Frémont, JOHN CHARLES, American ex-

plorer, born at Savannah, Georgia, 1813. He conducted five separate and adventurous expeditions which explored the passes of the Rocky Mountains, and practically opened up the great far west. He took an active part in the conquest of Upper California, and served in the civil war. Latterly he became a lawyer and an active promoter of railroads. He died in 1890.

French Beans, or KIDNEY-BEANS, the *haricots* of the French, are the products of the *Phaseŏlus vulgāris*, supposed to be a native of the East Indies, but now commonly cultivated in all parts of the globe. This plant is a twining annual, bearing alternate leaves, on footstalks, composed of three oval pubescent folioles. The flowers are whitish, somewhat resembling those of the pea. The seeds are more or less kidney-shaped. A great number of varieties are cultivated, among which is that commonly called *Lima bean*. They are eaten prepared in various manners.

French Berries, known also as *Avignon Berries* and *Yellow Berries*, the fruit of the *Rhamnus Clusii*, or other species of buckthorn, rather less than a pea, have a bitter and astringent taste and are used by dyers and painters as a yellow colouring matter.

French Chalk, scaly talc, a variety of indurated talc, in masses composed of small scales of a pearly-white or grayish colour: much used by tailors for drawing lines on cloth, and for similar purposes.

French Honeysuckle (*Hedysărum coronarium*), the inappropriate name of a leguminous plant, a common perennial in gardens, where it is grown for the sake of its beautiful scarlet flowers. In Sicily and Spain it is largely cultivated as a green crop, yielding an enormous quantity of herbage.

French Language and Literature. See *France*.

French Polish, a solution of shell-lac in alcohol, used for giving a smooth surface-coating to furniture and cabinet-work. The most common of the varnishes known under the name of French polish are prepared as follows: Pale shell-lac, 5½ oz.; finest wood-naphtha, 1 pint: dissolve. Or pale shell-lac, 3 lb.; wood-naphtha, 1 gallon. Methylated spirit (68 O.P.) may be substituted for the naphtha in the above formulæ. These varnishes are sometimes coloured to modify the character of the wood. A reddish tinge is imparted by dragon's-blood or red sanders-wood, and a yellowish tinge by gamboge or turmeric-root.

French Revolution. See *France*.

French River, a Canadian river, which flows from Lake Nipissing into Georgian Bay, Lake Huron; length 55 miles.

Frere, SIR HENRY BARTLE EDWARD, statesman and administrator, born at Clydale, Wales, 1815, died at Wimbledon 1884. He entered the East India Company's civil service in 1833; mastered the native languages with great rapidity, and introduced important improvements into the system of tax collection. From 1847 to 1850 he was resident at Sattara, and at the latter date succeeded Sir Charles Napier as chief-commissioner at Scinde. He rendered valuable services during the mutiny, at the close of which he was nominated to the viceroy's council at Calcutta. He returned to England in 1867. In 1872 he negotiated a treaty with the Sultan of Zanzibar, abolishing the slave-trade in that ruler's dominions. In 1877 he went to South Africa as commissioner for the settlement of native affairs, but this mission was a failure. He was the author of a life of his uncle, John Hookham Frere, numerous lectures, pamphlets, &c.

Frere, JOHN HOOKHAM, born in London 1769, died at Malta 1846. He is now chiefly remembered as one of the writers in the Anti-Jacobin Review at the close of the last century; and afterwards connected with the establishment of the Quarterly Review in 1809. A satirical poem published by him in 1817, entitled Prospectus and Specimen of an Intended National Work, by William and Robert Whistlecraft, followed by another entitled The Monks and the Giants, obtained in their day much popularity. His translations in verse of some of the comedies of Aristophanes are well known for their remarkable excellence. Mr. Frere entered parliament in 1796, and succeeded Canning as under-secretary for foreign affairs in 1799. In 1818–19 he acted as British ambassador in Spain, and subsequently held other diplomatic posts in Portugal and Prussia. The latter years of his life were spent in Malta.

Fréron (frā-rōṇ), ÉLIE CATHARINE, French journalist, born at Quimper 1719, died at Paris 1776. In 1746 he commenced a periodical entitled Lettres de Madame la Comtesse de ——; this, with various interruptions and change of name, was continued till his death. He may be called the founder of newspaper criticism in France; and had a life-long conflict with Voltaire and the encyclopedists.

Fresco Painting, a method of mural painting in water colours on fresh or wet grounds of lime or gypsum. Mineral or earthy pigments are employed, which resist the chemical action of lime. In drying, the colours are incorporated with the plaster, and are thereby rendered as permanent as itself. In producing fresco paintings, a finished drawing on paper, called a cartoon, exactly the size of the intended picture, is first made, to serve as a model. The artist then has a limited portion of the wall covered over with a fine sort of plaster, and upon this he traces from his cartoon the part of the design suited for the space. As it is necessary to the success and permanency of his work that the colours should be applied while the plaster is yet damp, no more of the surface is plastered at one time than what the artist can finish in one day. A portion of the picture once commenced, needs to be completely finished before leaving it, as fresco does not admit of retouching after the plaster has become dry. On completing a day's work, any unpainted part of the plaster is removed, cutting it neatly along the outline of a figure or other definite form, so that the joining of the plaster for the next day's work may be concealed. The art is very ancient, remains of it being found in India, Egypt, Mexico, &c. Examples of Roman frescoes are found in Pompeii and other places. After the beginning of the 15th century fresco painting became the favourite process of the greatest Italian masters, and many of their noblest pictorial efforts are frescoes on the walls of palaces and churches. Some ancient wall-paintings are executed in what is called *Fresco Secco*, which is distinguished from true fresco by being executed on dry plaster, which is moistened with lime-water before the colours are applied. Fresco painting has in recent years again been revived, and works of this kind have been executed in the British Houses of Parliament and other public and private buildings, more especially in Germany.

Freshwater Herring. See *Pollan*.

Freshwater Mussel. See *Mussel*.

Freshwater Shrimp. See *Shrimp*.

Freshwater Strata, in geology, strata formed by the deposition of mud, sand, &c., in lakes or rivers, or by fresh water filtering into caverns, the character of the strata being determined by an examination of the contained fossils. They are generally more limited in area than those deposited by the sea.

Fresnel (frā-nel), AUGUSTIN JEAN, French physicist, born 1788, died 1827. He did much to establish the undulatory theory of light, made several important discoveries in the polarizing of light, and greatly improved the apparatus for lighting lighthouses.

Fresnillo (-nil'yō), a city, Mexico, state of and 30 miles N.N.W. Zacatecas. In its vicinity are celebrated silver and copper mines. Pop. 13,000.

Fret, a kind of ornament much employed in Grecian art and in sundry modifications common in various other styles. It is formed of bands or fillets variously combined, but most frequently consists of continuous lines arranged in rectangular forms. Sometimes called *Key Ornament*.

Frets, certain short wood, ivory, or metal cross-bars on the finger-boards of stringed instruments, as the guitar, &c., which regulate the pitch of the notes. By pressing the string down to the finger-board behind a fret only so much of the string can be set in vibration as lies between the fret and the bridge.

Freudenstadt (froi'den-stät), a town of Würtemberg, 40 miles S.W. Stuttgart, with a fine old church and a town-house. Pop. 6204.

Freya, in the northern mythology, the goddess of love, and wife of Odhr; she was a friend of sweet song, and loved to hear the prayers of mortals. She had a famous necklace, much celebrated in Scandinavian legends. She is often confounded with Frigga.

Freyberg. See *Freiberg*.

Freyburg. See *Freiburg*.

Freycinet (frā-si-nā), CHARLES LOUIS DE SAULCES DE, French statesman, born at Foix (Ariége) 1828. He was trained as an engineer, and held several important appointments; he was elected to the senate in 1876; was minister of public works 1877; minister for foreign affairs 1877–79; and president of the council and minister for foreign affairs for longer or shorter periods in 1879, 1880, 1882, 1885, and 1886. He is the author of several important works on engineering.

Freytag (frī'tä*h*), GUSTAV, German poet, dramatist, and novelist, born 1816. He was editor of the Leipzig Grenzboten from 1848 to 1870, and has produced numerous successful plays, tales, and poems. Among his more famous works are Soll und Haben (Debit and Credit); Bilder aus der Deutschen Vergangenheit (Pictures from the German Past); Die Verlorene Handschrift (The Lost Manuscript); and Die Ahnen (Our Ancestors), a series of six romances illustrative of old German life.

Friar (Fr. *frère*, Lat. *frater*, brother), in the R. Cath. Ch. an appellation common to the members of all religious orders, but more especially to those of the four mendicant orders, viz. (1) Minors, Gray Friars, or Franciscans; (2) Augustines; (3) Dominicans or Black Friars; (4) White Friars or Carmelites.

Fribourg, or FREIBURG (frē-bör, frī'bųrh), a canton of Switzerland, surrounded by the cantons of Berne and Vaud, except a narrow part, which touches the Lake of Neufchâtel. The southern part is mountainous, the northern part more level. The whole canton abounds in excellent pasturage, and cattle-breeding and dairy husbandry are the chief occupations of the inhabitants. Area, 644 square miles; pop. 115,429, of whom the great majority are Roman Catholics speaking French.—The capital, which has the same name, is picturesquely situated on the Saane, 17 miles S.W. Berne. It stands partly on a rocky eminence at the edge of a ravine nearly surrounded by the river, which is here spanned by a suspension bridge 168 feet above the water. The Gothic church of S. Nicholas contains one of the finest organs in Europe. Pop. 11,546.

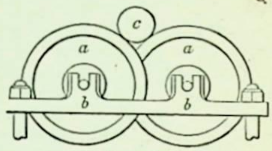
Fricassee (fri-kas-sē'), a dish of food made by cutting chickens, rabbits, or other small animals into pieces, and dressing them with a strong sauce in a frying-pan or a like utensil.

Fric'ative, a term applied to certain letters produced by the friction of the breath issuing through a narrow opening of the organs of articulation, as *f*, *v*, *s*, *z*, &c.

Friction, in physics, the effect of rubbing, or the resistance which a moving body meets with from the surface on which it moves. Friction arises from the roughness of the surface of the body moved on and that of the moving body. No such thing can be found as perfect smoothness of surface in bodies. In every case there is, to a less or greater extent, a roughness or unevenness of the parts of the surface, arising from peculiar texture, porosity, and other causes, and therefore when two surfaces come together the prominent parts of the one fall into the cavities of the other. This tends to prevent or retard motion, for in dragging the one body over the other an exertion must be used to lift the prominences over the parts which oppose them. What is called the *coefficient of friction* for any two surfaces is the ratio that subsists between the force necessary to move one of these surfaces horizontally over the other, and the pressure between the two surfaces. Thus the coefficient of friction for oak and cast-iron is 38 : 100, or ·38. Friction plays a most important part in nature and art; for instance, but for it threads could not be made nor textile fabrics manufactured.

Friction-rollers, a name common to any small rollers or cylinders employed to convert sliding motion into rolling motion. Such cylinders are often placed under heavy bodies when they are required to be moved any short distance on the surface of the ground; and, in machinery, the same method is occasionally employed to diminish the friction of a heavily-loaded axis. In that case a number of small cylinders are inclosed round the axis, and partake of its motion.

Friction-wheels, in machinery, two simple wheels or cylinders intended to assist in diminishing the friction of a horizontal axis. The wheels are simply plain cylinders *a*, *a*, carried on parallel and independent axes *b*, *b*. They are disposed so as to overlap pair and pair at each end of the main axis *c*, which rests in the angles thus formed by the circumferences. The axis, instead of sliding on a fixed surface, as in ordinary cases, carries round the circumferences of the wheels on which it is supported with the same velocity as it possesses itself, and in consequence the friction of the system is proportionally lessened.



Friction-wheels.

Friday, the sixth day of the week, from the Anglo-Sax. *Frige-dæg*, the day sacred to *Frigga* or to *Freya*, the Saxon Venus. See *Good Friday*.

Friedland (frēd'lânt). (1) A town of Northern Bohemia. Wallenstein was created Duke of Friedland in 1622. Pop. 4817.—(2) A small town of East Prussia, 28 miles S.E. of Königsberg, on the river Alle. Pop. 3366. The Russians under Benningsen were here defeated on the 14th June 1807, by the French under Napoleon.—(3) A town of Mecklenburg-Strelitz, 30 miles N.E. of Strelitz. Pop. 5502.

Friedrich (frēd'rih), the German form of *Frederick*.

Friedrichsthal (frēd'rihs-täl), a town in the extreme south of Rhenish Prussia, with glass-works and coal and iron mines. Pop. 5871.

Friendly Islands, or TONGA ISLANDS, a cluster in the South Pacific Ocean, between lat. 18° and 23° S., and lon. 173° and 176° W. They consist of three groups, which are divided from each other by two narrow channels, and number altogether about 150, with a collective area of about 400 sq. miles. The largest island is Tongatabu, in the S. group, with an area of 128 sq. miles, and containing the capital, Nukualofa. Vavao, in the N. group, which is named after it, is next Tongatabu in size; the centre group is called Hapai. The islands are nearly all volcanic, with coral reefs and rocks about them; earthquakes and volcanic eruptions are frequent; during one of which, in Oct. 1885, a new island 2 miles in circumference suddenly appeared. These islands were discovered in 1643 by Tasman, but received their collective name from Cook. They are now governed by a native Christian prince. The trade is considerable, the chief exports being copra, coffee, and wool. Pop. estimated at 17,500.

Friendly Societies, societies formed for the mutual advantage of the members, and based on the principle that it is by the contribution of the savings of many persons to one common fund that the most effectual provision can be made for casualties affecting, or liable to affect, all the contributors. Mutual provident associations, taking the friendly society form, may be grouped under seven main heads:—(1) Affiliated Societies; (2) Centralized or General Societies; (3) Peculiar Trade and Profession Societies; (4) Local, including Dividing, Clubs; (5) Collecting Burial Clubs; (6) Societies of Females; and (7) Societies of Juveniles. All these divisions, except the 5th, offer a sickness as well as a funeral benefit to their members, and some few of them offer a deferred annuity or superannuation as an optional benefit in addition. The following figures may be taken as giving the approximate number of members and extent of funds of such societies in 1888:—

	Members.	Funds.
(1) Affiliated Societies,	2,024,000	£13,103,000
(2) General Societies,	300,000	1,500,000
(3) Peculiar Trade Societies:		
a. Miners' Permanent Relief Funds,	230,000	253,000
b. Railway Group,	57,000	144,000
(4) Local Benefit Clubs,	1,000,000	2,000,000
(5) Collecting Burial Clubs,	3,590,000	2,286,000
(6) Societies of Females,	10,000	20,000
(7) Societies of Juveniles,	200,000	....
Total,	7,411,000	£19,306,000

Mutual provident association, on the voluntary principle and in a friendly society form, as an economic duty, is strictly confined at present to the English-speaking races, though attempts are being made to introduce the system in both Italy and Austria-Hungary. Provident insurance, indeed, is enforced throughout the German empire among all classes of workmen, but only as a form of state socialism enacted by law and largely subsidized by the employers. In France the method employed is the individualistic system of savings-banks.

The affiliated societies (or orders, as they are called) form the only group that extends its operations beyond the confines of the United Kingdom to America and the British colonies and dependencies. These societies are fraternities or brotherhoods, occupying in part the position of the old craft guilds. The Ancient Order of Foresters and the Independent Order of Oddfellows (Manchester Unity) far outstrip all the other orders in numerical and financial strength, the former possessing in the year 1891, 888,072 members, of whom 728,574 were male adults, and an accumulated capital of £5,488,813; the latter 835,902 members, and funds to the sum of £8,700,000, being the wealthiest friendly society in the world, as the Ancient Order of Foresters is the largest numerically. The amount of relief work done by these societies may be estimated from the fact that during a period of fourteen years the Manchester Unity has disbursed in sickness and funeral benefits to its members no less a sum than £7,442,000, and in the same period added three millions to its capital. The Order of Shepherds (Ashton Unity) is another powerful fraternity, being particularly strong in Scotland; other orders are known as Druids, Rechabites, Free-gardeners, Sons of Temperance, Romans, Locomotive Steam Enginemen and Firemen's Friendly Society, &c. The Rechabites and Sons of Temperance exhibit the economic phase of the temperance movement, and the former especially has increased very rapidly in recent years and possesses an adult membership of 75,000, with a capital of £450,000. The Locomotive Steam Enginemen, &c., is confined to railway employés, and is the only peculiar trade society which is constituted as an order. In this group, as a rule, the constitution and government are purely democratic, consisting of individual branches (called lodges, courts, tents, or senates),

local gatherings of branches (called districts), and a central executive elected from annual or biennial parliaments of branch delegates.

The general group consists of bodies with one central office and a scattered area of membership up and down the country, as the Hearts of Oak, the Rational Sick and Burial Association, and the United Patriots; or of bodies known as county societies, because the membership of each society is restricted to the geographical area of some one county—generally of the E. and S. of England. The Hearts of Oak is the giant among its fellows, taking out of the before-given totals for the group over 115,000 members and £907,000 capital. The funds are all centralized and not retained in districts and lodges (or courts), as is the case with the orders. The registered offices of these societies are generally situate in London, and, with the exception of those mentioned, their status cannot be considered satisfactory, since in financial matters they are behind the times.

Among the societies connected with peculiar trades the most important are those connected with mining. Indeed the miners' funds constitute the bulk of this division. These are accident insurance organizations, the funds of which are subsidized by the employers as a contribution towards their liabilities in the case of fatal or non-fatal casualties to the workmen in their employ. By means of them the workmen have largely contracted themselves out of the Employers' Liability Act of 1880. Membership is almost entirely confined to the coal-getting miners.

Local benefit clubs have had their day, and are being everywhere displaced by branches of the larger of the affiliated orders, as affording superior benefits with greater security. A large proportion of this division consists of what are termed tontine or dividing societies; *i.e.* temporary combinations on the mutual basis, which break up and divide their capital every twelvemonth or so, and then re-form and commence anew. There is here no foresight—no provision made for advancing years of life.

While all the foregoing provide, more or less, a sickness benefit to members, the collecting burial societies restrict themselves to insuring for a funeral benefit. The larger members of the group have nearly swallowed up the smaller, and in Britain there are four societies of over 100,000 members, which comprise between them over 90 per cent of the members, and over 88 per cent of the funds. These clubs are: Royal Liver, Liverpool Victoria Legal, Royal London, and Scottish Legal, the membership of the first two exceeding a million each. More than one-half, however, of gross membership is made up of children and non-adults. They are trading concerns chiefly for the benefit of the promoters and collectors, these latter calling from door to door for the weekly pence of the members. There is only a technical difference between them and the industrial insurance companies. The contrast in the amount of funds between these clubs and the affiliated societies is as striking as it is suggestive.

Societies of females occupy but a very small position in the great voluntary thrift army—a matter the more to be regretted since the number of girls and women workers in the United Kingdom is over four millions. The societies of juveniles consist (with the exception of a few attached to the general group) of branches of the affiliated orders connected with adult lodges or courts. Membership on the average commences at 5 years of age and continues to 18. The Foresters have 73,000 juveniles in their ranks, while the Rechabites number over 32,000. Altogether the number of different bodies of one class or another registered as separate societies or branches, in Great Britain and Ireland, is about 25,000, and of this total only some 400 belong to Ireland.

After being used by the 'masses' for a century and more the 'classes' have begun to adopt the friendly society form of mutual insurance, and we instance the establishment in London of a society of the general type for the benefit of the medical profession, the Medical Sickness and Annuity Friendly Society; and the Clergy Friendly Society, restricted to members of the Church of England.

Registration under the Friendly Societies Acts of 1875–76 confers many rights making for good government, but does not carry with it financial security. Members receive annual returns, and every five years the financial condition of societies is inquired into and a report made by a valuer, which should be hung up in a conspicuous place at the registered office. The funds are guarded against maladministration or fraud, and facilities for prosecution of the offender or offenders given. The three prime necessities for securing financial stability and efficient government are: (1) Registration,

(2) Valuation, (3) Graduation. This last requisite refers to the adoption of a graduated or sliding scale of annual contribution according to age on joining a society, in place of the old unscientific method of charging a uniform rate for all ages of entry. See also *Building Societies, Co-operative Societies.*

Friends. See *Quakers.*

Fries (frēs), ELIAS MAGNUS, Swedish botanist, born 1794, died 1878. In 1824 he was appointed professor of botany at the University of Lund, and in 1836 was transferred to that of Upsala. His botanical writings are very numerous, and cover the entire field of botany. He devised a natural system of classification, based on morphology and biology, which differs in many respects from those of Jussieu and Decandolle.

Fries (frēs), JAKOB FRIEDRICH, a German philosopher, born 1773, died 1843. He studied at the universities of Leipzig and Jena; in 1805 became professor of philosophy and mathematics at Heidelberg, and in 1816 was appointed to the chair of theoretical philosophy at Jena. His works are numerous, the most important being Neue Kritik der Vernunft, System der Philosophie als evidente Wissenschaft, and Wissen, Glaube und Ahnung. He aimed in his philosophical system to effect a reconciliation between the critical philosophy and faith.

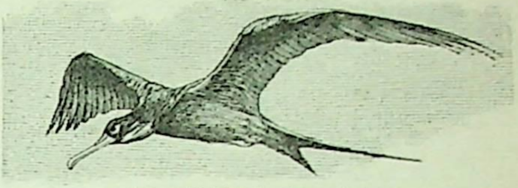
Friesland, the most northerly province of Holland, sometimes called West Friesland to distinguish it from East Friesland, now the district of Aurich in Hanover. It is generally flat, and parts of it are below sea-level. The area is 1281 sq. miles, four-fifths of which are under cultivation. Leeuwarden is the capital. Pop. 333,435. See *Frisians.*

Frieze (frēz), a kind of coarse woollen stuff or cloth, with a nap on one side.

Frieze (frēz), in architecture, that part of the entablature of columns which lies between the architrave and cornice. It is a flat member or face, usually enriched with figures or other ornaments of sculpture. See *Entablature.*

Frig'ate, in the navy, among ships of war of the older class, a vessel of a size larger than a sloop or brig and less than a ship of the line; usually carrying her guns (which varied from about thirty to fifty or sixty in number) on the main deck and on a raised quarter-deck and forecastle, or having two decks. Such ships were often fast sailers, and were much employed as cruisers in the great wars of the 18th and early part of the 19th centuries. Since the introduction of iron-clad vessels the term cruiser has been applied to ships taking the place of the frigates of former days.

Frigate-bird, or MAN-OF-WAR BIRD (*Tachypĕtes aquilus*), a tropical web-footed bird of the family Pelecanidæ. Including the long tail the male bird reaches 3 feet in length, but the body is comparatively small. The bill is longer than the head, strong, hooked at the point, and sharp. In proportion to their size their wings are longer than in any other bird, having an extent of 7 feet or more. Their flight is powerful and graceful; they neither swim nor wade, but catch the flying-fishes in the air, and cause fishing-birds to disgorge their prey, which they dexterously seize as it falls.



Frigate-bird (*Tachypĕtes aquilus*).

Frigga, or FRIGG, in northern mythology, the wife of the god Odin, the goddess after whom Friday is named. She is a goddess in some respects corresponding with Venus, and is often confounded with Freya.

Frilled Lizard, an Australian lizard, *Chlamydosaurus Kingii*, so called from a curious membrane-like ruff or tippet round its neck, covering its shoulders, and which lies back in plaits when the animal is tranquil, but which elevates itself when it is irritated or frightened. A full-grown specimen is about 3 feet in length.

Frimaire (frē-mār; Fr., from *frimas*, hoar-frost), the third month of the French republican calendar, dating from September 22, 1792. It commenced November 21, and ended December 20.

Fringe-tree (*Chionanthus virginica*), a small tree belonging to the same natural family with the olive, and having snow-white flowers which hang down like a fringe, inhabiting America from lat. 39° to the Gulf of Mexico. It is frequently cultivated in gardens as an ornamental plant.

Four other species of *Chionanthus* are known, two of which inhabit the West Indies, the third Ceylon, and the fourth Australia.

Fringillidæ, a large family of conirostral birds, comprising the finches (which see).

Frisches-Haff, an extensive lagoon of Prussia, on the Baltic, from which it is separated by a long and narrow line of low gravel and sand-banks called the Frische-Nehrung, and with which it communicates by a narrow strait, on the north side of which is the town of Pillau.

Frisians, a German tribe who, about the beginning of the Christian era, occupied the territory between the mouths of the Rhine and the Ems. They became tributaries of Rome under Drusus, and lived for some time on friendly terms with their conquerors, but were driven to hostilities by oppression. In time they extended as far eastward as Slesvig, and even made settlements on the Firth of Forth, and probably in other parts of Northern Britain. About the end of the 7th century the Frisians in the south-west were subdued by the Franks under Pépin d'Héristal, who compelled them to accept Christianity. A century later the eastern branch of the tribe was conquered and Christianized by Charlemagne. Their country was divided into three districts, two of which were annexed on the division of the Carlovingian Empire to the possessions of Louis the German, and the other to those of Charles the Bald. The latter part was called West Frisia (W. Friesland), and the two former East Frisia (E. Friesland). Their modern history is chiefly connected with Holland and Hanover. The *Frisian Language* holds in some respects an intermediate position between Anglo-Saxon and Old Norse. Of all the Teutonic dialects it is the most nearly related to English. Its ancient form exists only in some remarkable collections of laws. Three dialects of it are now recognized: the West Frisian, spoken in the Dutch province of Friesland, about Leeuwarden, Bolsward, &c., and used to some extent in literature; the East Frisian, spoken between the mouths of the Ems and Weser; and the North Frisian, spoken on the west coast of Schleswig and South Jutland, and on the islands Sylt, Föhr, Amrun, &c.

Frit, the matter of which glass is made after it has been calcined. (See *Glass*.) The term is also applied to semi-vitrified earthenware, often pounded and used for glaze.

Frit, the *Chlorops* or *Oscinis frit*, a small greenish-black fly, the larvæ of which do great damage to barley crops in some parts of the north of Europe. It is nearly allied to the corn or wheat fly known in Britain.

Frith. See *Firth*.

Frith, William Powell, R.A., born at Studley, near Ripon, 1819. Since 1840, when he exhibited Malvolio before Olivia at the Royal Academy, he has produced a great number of scenes from Shakspere, Molière, Dickens, Sterne, Goldsmith, &c., besides his immensely popular pictures, Coming of Age in the Olden Time (1849), Life at the Sea-side (1854), The Derby Day (1858), The Railway Station (1862), Before Dinner at Boswell's Lodgings (1868—sold in 1875 for £4567), The Private View at the Royal Academy (1881), &c. He was commissioned by the queen to paint the marriage of the Prince of Wales. He was elected R.A. in 1852, and is a member of several foreign academies. Large engravings have been produced from a number of his pictures. In 1887–88 he published his autobiography, 3 vols. 8vo.

Frith Gilds, among the Anglo-Saxons, voluntary associations of neighbours for purposes of order and self-defence. They repressed theft, traced stolen cattle, and indemnified parties robbed from a common fund raised by subscription of the members.

Frithjof (frēt'yof), an Icelandic hero, supposed to have lived in the 8th century. After a series of adventures, recorded in an ancient Icelandic saga of the 13th century, he marries Ingebjörg, the widow of the king Hring. The story forms the groundwork of Tegnér's popular poem, Frithjof's Saga, and has been frequently translated.

Frit'illary (*Fritillaria*), a genus of plants, nat. order Liliaceæ, natives of north temperate regions. *F. Meleagris*, or common fritillary, is found in meadows and pastures in the eastern and southern parts of England. Several species, as *F. imperialis* or crown-imperial, are cultivated in gardens, chiefly introduced from Persia and the warmer parts of Europe.

Frit'illary, the popular name of several species of British butterflies. The *Argynnis paphia* is the silver-washed fritillary; the *A. aglaia* is the dark-green fritillary; the rare and much-prized *A. lattonia* is the queen-of-Spain fritillary.

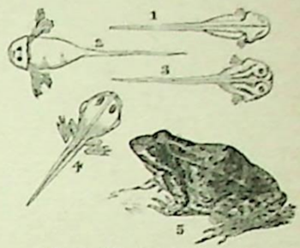
Friuli (fri-ö'lē), a formerly independent duchy at the head of the Adriatic, now forming part of Italy and Austria. It was

one of the most important duchies of the Longobard Kingdom, and up to the 15th century, when it was conquered by Venice and its territories dismembered, it retained a considerable degree of independence. The inhabitants, called Furlani, are Italian for the most part, but speak a peculiar dialect.

Fro'bisher, Sir Martin, one of the great Elizabethan navigators, born near Doncaster, England, about 1535; died at Plymouth 1594. He made three expeditions to the Arctic regions for the purpose of discovering a north-west passage to India, and endeavoured to found a settlement north of Hudson's Bay, hopes of immense wealth to be found in these northern regions having taken the public fancy. In 1585 he accompanied Sir Francis Drake to the West Indies. At the defeat of the Spanish armada in 1588 he commanded one of the largest ships in the fleet, and was honoured with knighthood for his services. In the years 1590 and 1592 he commanded squadrons against the Spaniards and took many rich prizes. In 1594 he was sent to the assistance of Henry IV. of France, when, in an attack on a fort near Brest, he was mortally wounded.

Froebel (fr*eu*'bėl), Friedrich Wilhelm August, German educationist, born 1782, died 1852. After an unsettled and aimless youth, and with somewhat imperfect culture, he started teaching, and soon developed a system which has become famous under the name of *Kindergarten* (which see). He is the author of Die Menschenerziehung (Human Education), and Mutter-und-Koselieder, a book of poetry and pictures for children. A Froebel Society, for the promotion of the Kindergarten system, was established in 1874.

Frog, the common English name of a number of animals belonging to the class Amphibia, having four legs with four toes on the fore feet and five on the hind, more or less webbed, a naked body, no ribs, and no tail. Owing to the last peculiarity frogs belong to the order of amphibians known as Anura or tailless Amphibia. The tongue is fleshy, and is attached in front to the jaw, but is free behind, so that the hinder extremity of the tongue can be protruded. Frogs are remarkable for the transformations they undergo before arriving at maturity. In the spring the spawn is deposited in ponds and other stagnant waters in large masses of gelatinous matter. These masses, with black globules scattered through them, soon manifest change, and after a time the young escapes as a tadpole, as an animal with short body, circular suctorial mouth, and long tail, compressed from side to side. Gills project on either side of the head from a cleft which answers in position to the gill opening of fishes. The hind limbs first appear as buds, later the fore limbs project,



Frog and its metamorphoses.
1, 2, 3, 4, Various stages of tadpole state; 5, fully formed animal.

the gills disappear, the lungs becoming more fully developed; the tail gradually shrinks and disappears, and the animal, which was at first fish-like, then closely resembled a newt (or tailed Amphibian), finally assumes the adult or tailless form. The mature frog breathes by lungs, and cannot exist in water without coming to the surface for air. The only British species is the common frog (*Rana temporaria*), but the tribe is very numerous, other varieties being the edible frog (*R. esculenta*) of the south of Europe, eaten in France and South Germany, the hind quarters being the part chiefly used; the bull-frog of America (*R. pipiens*), 8 to 12 inches long, so named from its voice resembling the lowing of a bull; the blacksmith frog of Janeiro; the Argus frog of America, &c. Of the tree-frogs most belong to the genus *Hyla*. (See *Tree-frog*.) Frogs swim with rapidity, and move by long bounds, being able from the power of the muscles of their hind-legs to leap many times their own length.

Frog-fish. See *Angler*, and also *Cheironectes*.

Frog-spit. Same as *Cuckoo-spit*.

Frohsdorf. See *Froschdorf*.

Froissart (frwä-sár), Jean, a French poet and historian, was born in 1337 at Valenciennes, died in Flanders between 1400 and 1410. He received a liberal education, and took orders in the church, but his inclination was more for poetry and gallantry. At the age of eighteen he went to England, where, having already the reputation of being a gay

poet and narrator of chivalric deeds, he was received with great favour, Philippa of Hainault, wife of Edward III., declaring herself his patroness. After returning to the Continent and travelling for some time, he again visited England, and in 1361–66 he was a secretary to the queen. He also visited Scotland, and was entertained by King David Bruce, and William, earl of Douglas. In 1366 he left England and again travelled. After the death of Queen Philippa, Froissart became curé of Lestines in Hainault, and was patronized by Wenceslaus, duke of Brabant, who was himself a poet, and of whose verses, united with some of his own, Froissart formed a sort of romance called Meliador. On the death of Wenceslaus he entered the service of Guy, count of Blois, who gave him the canonry of Chimay, and induced him to take in hand the history of his own time. After twelve years of a quiet life he again began his travels, chiefly for the purpose of collecting further matter for his Chronicle, and he again visited England after a lapse of forty years. Little is known of the closing part of his life, which is said to have terminated at Chimay. His Chronicle, which reaches down to 1400, gives a singularly vivid and interesting picture of his times, and also presents his own character in a pleasing light. The best edition of his Chronicle is that of Buchon, which also contains his collected Poésies (Paris, 1835–36, three vols.). The earliest, and in some respects the best, English translation is that of Lord Berners (London, 1525), although that by Thomas Johnes (1803–5) is more exact.

Frome, or FROME-SELWOOD, a town, England, county Somerset, on a small river of the same name, 19 miles south-east of Bristol. The staple manufactures are woollen cloths. Previous to 1885 it sent one member to parliament; it now gives name to a parl. district. Pop. 9613.

Fronde (frond), a French party during the minority of Louis XIV., which waged civil war against the court party on account of the heavy fiscal impositions laid on the people by Cardinal Mazarin, whom the queen-mother had appointed prime-minister after the decease of Louis XIII. (1643). At the head of the Fronde stood the Cardinal de Retz (which see), and latterly the Prince Louis Condé. The result of this contest, which lasted from 1648 to 1654, served only to strengthen the royal power. The name is from Fr. *fronde*, 'a sling,' a member of the parliament having likened the party to boys slinging stones in the streets, but who dispersed on the appearance of the authorities.

Fronti'nus, SEXTUS JULIUS, a Roman of patrician descent, born about A.D. 40, died 106. He was governor of Britain from 75 to 78, and distinguished himself in the wars of the Silures. He appears to have been twice consul, and was appointed by Nerva to superintend the aqueducts, on which he also wrote. His De Stratagematibus, a treatise on war, and his De Aquæductibus Urbis Romæ are well known.

Fronto, MARCUS CORNELIUS, Roman orator and rhetorician of the 2d century after Christ, born at Cirta in Numidia. Having removed to Rome, he won the special favour of Hadrian and Antoninus Pius, and was intrusted with the education of the imperial princes Marcus Aurelius and Lucius Verus. His extant remains consist chiefly of some letters to these princes.

Froschdorf (frosh'dorf; called by the French *Frohsdorf*), a village in Lower Austria, on the river Leitha, about 30 miles from Vienna. It is remarkable for its magnificent castle, which has acquired a kind of political importance since 1844, when it became the head-quarters of the Bourbon party. It was the favourite residence of the late Comte de Chambord, who greatly improved and beautified the interior.

Frosino'ne, a town, Italy, near the left bank of the Cosa, 50 miles E.S.E. of Rome. Pop. 9768.

Frost is the name we give to the state of the weather when the temperature is below the freezing-point of water (32° F.). The intensity of the cold in frost is conveniently indicated by the popular expression so many *degrees of frost*, which means that the temperature of the atmosphere is so many degrees below the point at which the freezing of water commences. Frost is often very destructive to vegetation, owing to the fact that water, which is generally the chief constituent of the juices of plants, expands when freezing, and bursts, and thus destroys, the vesicles of the plant. In the same way rain-water, freezing in the crevices of rocks, breaks up their surfaces, and often detaches large fragments. Hoar-frost is frozen dew. It may either freeze while it is falling, when it is found loosely scattered on the ground; or being deposited as dew in the early part of the night it may freeze during a subsequent part of it, owing to radiation. It is

generally seen most profusely in spring and autumn; because at those times, while on clear nights the cold is sufficient to freeze the dew, the days are at the same time sufficiently warm to cause a very considerable quantity of moisture to evaporate into the air.

Frost-bite, a condition caused by the action of frost on the human economy. It is generally local and partial, varying from ordinary chilblain to complete death of the part frozen. The simplest treatment consists in coaxing back the vitality of the part affected by means of friction.

Frosted-glass, glass roughened on the surface, so as to destroy its transparency, in consequence of which the surface has somewhat the appearance of hoar-frost.—The term *frosted* is also applied to the dead or lustreless appearance of gold and silver jewelry when polishing the surface is omitted.

Froth-fly, FROTH-HOPPER, the common name of insects of the family Cercopidæ, the larvæ and pupæ of which are found in a frothy exudation on plants. See *Cuckoo-spit*.

Froude (fröd), JAMES ANTHONY, historian and miscellaneous writer, born at Totness, Devonshire, 1818. He was educated at Oxford, was elected fellow of Exeter College, and received deacon's orders. He resigned his fellowship and withdrew from orders on the publication of his Nemesis of Faith, 1848. Between the years 1856 and 1869 appeared his great work The History of England from the Fall of Wolsey to the Defeat of the Spanish Armada, which was very popular, though it received but doubtful approval from historians. He was for some time editor of Fraser's Magazine, to which he contributed many articles, as well as to other periodicals. He was elected rector of St Andrews University in 1869; travelled in the United States in 1874; and visited the Cape Colony on a political mission, 1874-75. He was made literary executor to Carlyle, and his Life of Carlyle, and Carlyle's Reminiscences, and Letters and Memorials of Jane Welsh Carlyle, as edited by him, provoked an extraordinary amount of interest and controversy. Among his other works are Short Studies on Great Subjects; English in Ireland in the Eighteenth Century; Julius Cæsar; Oceana, or England and her Colonies; The English in the West Indies, &c. He died in 1894.

Fruc'tidor, the twelfth month of the French republican calendar (dating from September 22, 1792), beginning August 18, and ending September 16.

Fruit, in botany, the seed of a plant, or the mature ovary, composed essentially of two parts, the pericarp and the seed. In a more general sense the term is applied to the edible succulent products of certain plants, generally covering and including their seeds. The hardier sorts of fruits, such as are indigenous to Britain, or which have been cultivated to any important extent there, are the apple, pear, plum, cherry, apricot, peach, and nectarine; the gooseberry, currant (red, white, and black), raspberry, strawberry, mulberry. The more important fruits requiring a warmer climate are the fig, date, grape, orange, lime, banana, tamarind, pomegranate, citron, bread-fruit, olive, almond, melon, coco-nut, &c. Some fruits are of immense economic importance, either from supplying food to great numbers of people (dates) or from furnishing beverages in extensive use (as wine from the grape). The total value of the fruit imported into the U. Kingdom in 1895 was over £6,520,000.

Fruit-pigeon, the name given to the pigeons of the genus *Carpophăgus*, birds of very brilliant plumage, occurring in India, the warmer parts of Australia, &c. They are so called because they feed entirely on fruit.

Frustum, in geometry, the part of a solid next the base, left by cutting off the top portion by a plane parallel to the base; or the part of any solid between two planes, which may be either parallel or inclined to each other, as the *frustum* of a cone, of a pyramid, or of a sphere, which latter is any part comprised between two parallel circular sections.

Fry, ELIZABETH, philanthropist, the third daughter of John Gurney, of Earlham Hall, near Norwich, was born 1780, died at Ramsgate 1845. In her eighteenth year a sermon preached by William Savery, an American Quaker, at Norwich, had the effect of turning her attention to serious things, and making her adopt decided views on religious matters. About this time also she made the acquaintance of Joseph Fry, a London merchant and a strict Quaker, to whom she was married in 1800. In 1810 she became a preacher among the Friends. Having paid a visit to Newgate in 1813, she was so impressed by the scene of squalor, vice, and misery which she there witnessed, that the amelioration of prison life became

with her a fixed object. In 1817 she succeeded in establishing a ladies' committee for the reformation of female prisoners in Newgate, along with a school and manufactory in the prison, the results of which proved eminently satisfactory. These improvements were shortly afterwards introduced by her means into other prisons. In the pursuit of her philanthropic labours she made tours through various parts of the United Kingdom, and also visited France, Belgium, Germany, and Holland.

Fuad Pasha, MEHEMED, Turkish statesman and man of letters, was born at Constantinople 1814, died at Nice 1869. His diplomatic career took him to London, Madrid, and St. Petersburg; he was four times minister of foreign affairs, and for five years grand vizier; and was the chief support of the reform party in the Turkish empire. He wrote poetry, political pamphlets, and a Turkish grammar, which has been translated into several languages.

Fuca, STRAIT OF. See *Juan de Fuca, Strait of*.

Fuca'ceæ, a nat. order of dark-coloured algæ, consisting of olive-coloured inarticulate sea-weeds, distinguished from the other algæ by their organs of reproduction, which consist of archegonia and antheridia, contained in common chambers or conceptacles, united in club-shaped receptacles at the ends or margins of the fronds. Fucaceæ exist in all parts of the ocean, and, though all are probably occasionally attached, they may persist as floating masses, like the gulf-weed. *Macrocystis pyrifĕra* is said to have fronds of 500 to 1500 feet long. See *Fucus*.

Fu-chow. See *Foo-chow*.

Fuchsia (fū'shi-a; named after the discoverer Leonard *Fuchs*, a German botanist), a genus of beautiful flowering shrubs, natives of South America, Mexico, and New Zealand, nat. order Onagraceæ, characterized by having a funnel-shaped, coloured, deciduous, four-parted calyx, sometimes with a very long tube; four petals set in the mouth of the calyx-tube and alternating with its segments; eight exserted stamens, and a long style with a capitate stigma. This is one of our most common decorative greenhouse plants, while the hardy varieties out of doors in the open border form an important feature with their drooping elegant habit and their wonderful profusion of flowers.

Fucino, or CELANO (fō'chē-nō, chel-ä'nō; Latin, *Fucĭnus Lacus*), formerly a lake of Southern Italy, about 11 miles long and 5 miles broad, 2181 feet above sea-level in the province of Aquila in the central Apennines. As the lake often rose and submerged the neighbouring lands, the emperor Claudius caused a tunnel to be constructed to carry off its surplus waters into the Garigliano. This vast work was soon allowed to fall into disrepair. Between 1852 and 1875, however, this work was repaired and enlarged by a company, and the lake has now been thoroughly drained, and 36,000 acres of rich arable land reclaimed.

Fucus, a genus of sea-weeds, family Fucaceæ, comprising various common sea-weeds which have a flat or compressed forked frond, sometimes containing air-vessels. Many of the species are exposed at low-water; they form a considerable proportion of the sea-weeds thrown up on some coasts, and are used for manure and for making kelp. Most contain iodine.

Fuel, carbonaceous matter, which may be in the solid, the liquid, or the gaseous condition, and which, in combining with oxygen, gives rise to the phenomenon of heat, the heat being made use of for domestic, manufacturing, or other purposes. The most important of the gaseous fuels is common coal-gas, which is now commonly applied for the heating of rooms by means of gas-fires and gas-stoves. For such purposes the coal-gas should be mixed with air just below the point at which it is burned. It then gives a blue, hot, and smokeless flame. A gas-fire may be obtained in an ordinary grate by filling it with asbestos, which is heated to incandescence by gas properly applied. Gas-stoves of various constructions are also used for heating apartments, cooking, &c. Another gaseous fuel now coming into use for industrial purposes is water-gas, obtained by the decomposition of water. The principal liquid fuels are petroleum, shale-oil, creasote, the various animal and vegetable oils, and alcohol. It is only the mineral oils that are used to any great extent for producing heat. Alcohol is only employed in operations requiring the application of a small volume of heat, and in such it is as convenient and manageable a fuel as can be desired. Successful attempts have been made in recent times to discover methods by which liquid fuel, and more especially petroleum, may be applied to the heating of steam-boilers. In some of the systems it is the combustion of the oil itself, supplied in the form of spray, that produces the heat; in others the oil is volatilized by

means of superheated steam, and the gas is burned in the furnace from ordinary pipes as in a gas-stove. The heating power of petroleum is considerably greater than that of coal, and in a ship, for instance, it would occupy less space, while the laborious process of stoking would be dispensed with. Creasote has been successfully employed as fuel in the process of armour-plate bending. Peat is used as a domestic fuel in many places, but, compared with the more solid fuels, it is unfit to be employed for producing very strong heats. An improvement in the use of it as a fuel, however, has been introduced by employing a process of compression, which gives it almost the solidity of coal. It is also sometimes soaked in oil or tar, and then used in the form of bricks. Wood, though comparatively little used as a fuel in Great Britain, is in some countries almost the only sort of fuel to be had. In France, Germany, &c., it is extensively used in metallurgy as well as for domestic purposes. Before it is suited for making satisfactory fuel, wood must be dried for a considerable time either in the open air or under cover, but the latter method is the better, as little or no decomposition of the wood goes on. Woods that have a close and compact texture, such as the oak, beech, or elm, burn much more slowly and with less flame than soft woods like the lime, horse-chestnut, or pine; the latter are consequently preferred as fuel for some purposes. By far the greatest proportion of the fuel consumed in Great Britain consists of coal. Coal, as is well known, is of vegetable origin, and this is clearly seen in that variety of it known as lignite, which still retains its woody structure, even to the eye. Wood charcoal is another kind of fuel which is extensively used in metallurgy, chemistry, and in various industrial arts. It kindles quickly, emits few watery or other vapours while burning, and, when consumed, leaves few ashes, and those very light. They are, therefore, easily blown away, so that the fire continues open, or pervious to the current of air which must pass through it to keep it burning. This sort of fuel, too, is capable of producing as intense a heat as can be obtained by any; but in violent heats it is quickly consumed, and needs to be frequently supplied. Coke or pit-coal charred is a fuel which possesses in many respects the same properties as charcoal of wood. It is employed for producing intense melting heats. Various kinds of artificial fuel are manufactured. These are composed of different ingredients, of which coal slack or dust is the most important. The coal-dust is mixed with some adhesive substance, such as clay, lime, coal-tar, &c., and compressed into bricks. Slack-coal has also been employed as fuel in an entirely different mode. It is ground as fine as possible, and blown into the furnace, where it burns much in the same way as the spray of liquid fuel. An immense quantity of fuel is lost by bad or wasteful methods of using. In ordinary grates the greater part of the heat escapes up the chimney and is utterly lost, while the noxious gases arising from the combustion of the coal find their way to a greater or less extent into the room. Close stoves, though more economical, have a cheerless look to an English eye, besides the fact that they do not keep up the requisite circulation of air in the room. There are, however, several forms of improved grate for simply and effectively economizing fuel, and at the same time giving a maximum of heat and ventilation to the room.

Fuente (fu-en'tā), with affixes, the name of numerous small towns in Spain. The most important is FUENTE-DEL-MAESTE, a town, province of Badajoz, near the right bank of the Guadajira, 32 miles S.S.E. of Badajoz. Pop. 6580.

Fuentes d'Ono'ro, a village of Spain, province of Salamanca, about 16 miles W.S.W. of Ciudad Rodrigo, the scene of two engagements fought between Wellington and Masséna on 3d and 5th May, 1811, the result of which was that the French were forced across the Portuguese frontier, and an end was put to the French invasion of Portugal.

Fuero (fu-ā'rō), a Spanish word signifying jurisdiction, law, privilege, and applied historically to the written charters of particular districts, towns, &c. In 1833 a civil war broke out in the Basque provinces, in assertion of the fueros of that district, which lasted ten years, and was only pacified by the formal recognition of the Basque privileges in 1844 by the queen and cortes of Spain. The Basque fueros, however, were finally abrogated in 1876 as a result of the Carlist rising.

Fuerteventu'ra, one of the Canary Islands, separated from Lancerota by the Strait of Bacayna. Cabras on the east coast has a good harbour. Area, 758 sq. m. Pop. about 11,600.

Fugger Family, a distinguished German family, early admitted among the hereditary nobility, and now represented by two main

lines of princes and several minor noble branches. The founder of this family was JOHANN FUGGER, a master-weaver who settled in Augsburg in 1368 and acquired much property. His descendants became leading bankers, merchants, and mine-owners; were



Jakob von Fugger.

liberal and public-spirited men, patrons of art, and several of them became distinguished soldiers and statesmen. Among the most eminent of the family was JAKOB FUGGER (1459–1525), who carried on great commercial operations, advanced money to the Emperors Maximilian and Charles V., and by the former was raised to the rank of nobleman, being also imperial councillor under both. Charles V. raised Jakob's two nephews, Raimund and Anton Fugger, to the dignity of counts. He also invested them with the estates of Kirchberg and Weissenhorn, which had been mortgaged to them, granted them a seat at the imperial diet, and letters giving them princely privileges. Latterly the highest places of the empire were held by the Fuggers, and princely families thought themselves honoured by their alliance.

Fugue (fūg), a musical term derived from the Latin word *fuga* (a flight), and signifying a polyphonic composition constructed on one or more short subjects or themes, which are harmonized according to the laws of counterpoint, and introduced from time to time with various contrapuntal devices, the interest in these frequently-heard themes being sustained by diminishing the interval of time at which they follow each other, and monotony being avoided by the occasional use of episodes, or passages open to free treatment.

Fuhnen. See *Funen.*

Fuji-Yama or FUSI-YAMA, a dormant volcano of a symmetrical cone-like shape, in the island of Hondo, Japan, the sacred mountain of the Japanese. It has been quiescent since 1707; is 12,400 feet in height, and is visible in clear weather for a distance of nearly a hundred miles.

Fula, FULBE. See *Fellatah.*

Fulcrum, in mechanics, the support or fixed point about which a lever turns. See *Lever.*

Fulda, a Prussian town, province of Hessen-Nassau, on a river of the same name, 54 miles S.S.E. Cassel. It is irregularly built; contains a cathedral, a handsome modern edifice; a castle, once occupied by the prince bishops; a library of 50,000 volumes; and has manufactures of cotton, woollen, and linen goods, &c. The town derives its origin from a once-celebrated abbey founded by St. Boniface (Winfried), the apostle of Germany, in 744. Pop. 12,284.

Ful'gora, the generic name of the lantern-flies (which see).

Ful'gurite, any rocky substance which has been fused or vitrified by lightning. More strictly, a vitrified tube of sand formed by the intense heat of lightning penetrating the sand, and fusing a portion of the materials through which it passes.

Fulham (ful'am), one of the London parliamentary boroughs, bounded by the Thames, and the boroughs of Chelsea, Kensington, and Hammersmith. It contains the palace of the Bishop of London, and returns one member to parliament. Pop. (1891), 91,640.

Fu'lica. See *Coot.*

Fulig'ula. See *Pochard.*

Fuller (ful'ėr), ANDREW, English Baptist minister and theological and controversial writer, born 1754, died 1815. In 1782 he accepted the pastoral charge of a Baptist church at Kettering, in Northamptonshire, in which office he continued till his death. His theology was a moderate Calvinism, and he devoted much of his energy to the subject of foreign missions. His works have been frequently reprinted.

Fuller, MARGARET. See *Ossoli* (*Margaret Fuller*).

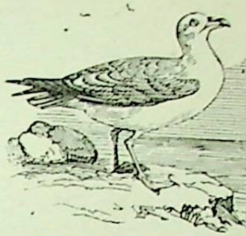
Fuller, THOMAS, an eminent historian and divine of the Church of England, born in 1608 at Aldwinkle, in Northamptonshire,

died 1661. He was sent to Queen's College, Cambridge, where he graduated B.A. in 1625, M.A. in 1628. He afterwards removed to Sidney Sussex College in the same university; and being chosen minister of St. Benet's parish, Cambridge, he became very popular as a pulpit orator. In 1631 he obtained a fellowship at Sidney Sussex, and was collated to a prebend in the cathedral of Salisbury. He was next chosen rector of Broad Windsor, Dorset, and lecturer at the Savoy, London. In 1643 he went to Oxford and joined the king; left in a few months for the army, in which he became chaplain to Sir Ralph Hopton, and employed his leisure in making collections relative to English history and antiquities. At the close of the war he took refuge in Exeter, and was appointed chaplain to the infant Princess Henrietta Maria. Shortly before the restoration he was reinstated in his prebendal stall, and soon after that event was made one of the king's chaplains. Several of his writings are English classics, remarkable for quaintness of style, wit, sagacity, and learning. Among the more important are: History of the Holy War; The Holy and Profane State; Pisgah Sight of Palestine; Church History of Britain; and the Worthies of England, a production valuable alike for the solid information it affords relative to the provincial history of the country, and for the profusion of biographical anecdote and acute observation on men and manners.

Fuller's Earth, a variety of clay or marl, compact but friable, unctuous to the touch, and of various colours, usually with a shade of green. It is useful in scouring and cleansing cloth, as it imbibes the grease and oil used in preparing wool. It consists of silica 50 per cent, alumina 20, water 24, and small quantities of magnesia, lime, and peroxide of iron. There are very extensive beds of this earth in several counties in England.

Fulling-mill, a mill for fulling cloth by means of pestles or stampers, which beat and press it to a close or compact state, and cleanse it. The principal parts of a fulling-mill are the wheel, with its trundle, which gives motion to the tree or spindle, whose teeth communicate that motion to the pestles or stampers, which fall into troughs, wherein the cloth is put, with fuller's-earth, to be scoured and thickened by this process of beating.

Fulmar, a natatorial or swimming oceanic bird (*Fulmārus glaciālis*) of the family Procellariidæ or petrels, about the size of a large duck. It inhabits the northern seas in prodigious numbers, breeding in Iceland, Greenland, Spitzbergen, the Shetland and Orkney Islands, the Hebrides, &c. It feeds



Fulmar (*Fulmārus glaciālis*).

on fish, the blubber of whales, and any fat, putrid, floating substance that comes in its way. It makes its nest on sea-cliffs, in which it lays only one egg. The natives of St. Kilda value the eggs above those of any other bird. The fulmar is also valued for its feathers and down, and for the oil found in its stomach, which is one of the principal products of St. Kilda. When caught or assailed it lightens itself by disgorging the oil from its stomach. There is another and larger species found in the Pacific Ocean.

Fulmination, a term used in chemistry to denote the sudden decomposition of a body by heat or percussion, accompanied by a flash of light and a loud report. Fulminating compounds, or fulminates, are explosive compounds of fulminic acid with various bases, such as gold, mercury, platinum, and silver. The old fulminating powder is a mixture of sulphur, nitre, and potash. Fulminate of mercury forms the priming of percussion-caps.

Fulminic Acid, a peculiar acid known only in combination with certain bases, and first discovered along with mercury and silver, with which it forms powerfully detonating compounds.

Fulton, Robert, an American engineer, the introducer of steam navigation on American waters, was born in Pennsylvania in 1765, died 1815. He adopted the profession of portrait and landscape painter, and in his twenty-second year proceeded to England for the purpose of studying art under West. There he became acquainted with the Duke of Bridgewater, Earl Stanhope, and James Watt, and was led to devote himself to mechanical engineering. In 1794 he took a

patent for a double inclined plane, which was intended to supersede locks on canals; and he also patented a mill for sawing marble, machines for spinning flax and making ropes, a dredging-machine, &c. In 1797 he went to Paris, where he produced the first panorama that was exhibited there. He also, after some trials, was successful in introducing a boat propelled by steam upon the Seine. During a visit to Scotland he had seen and obtained drawings of the *Charlotte Dundas*, a steam-vessel which had plied with success on the Forth and Clyde Canal. His chief occupation in Paris, however, was the invention of torpedoes for naval warfare. He returned to America in 1806, and built a steam-boat of considerable dimensions, which began to navigate the Hudson River in 1807. Its progress through the water was at the rate of 5 miles an hour. In 1814 he constructed the first war steamship, and was engaged upon an improvement of his submarine torpedo when he died.

Fu'mage (Lat. *fumus*, smoke), a tax on every house with a chimney, mentioned in Domesday Book, and commonly called smoke-farthings. It is supposed to have been the origin of the *hearth-money* imposed by Charles II., and repealed by 1 William and Mary, cap. x.

Fuma'ria. See *Fumitory*.

Fumaria'ceæ, a small nat. order of exogenous plants, closely allied to Papaveraceæ. The species are slender-stemmed, herbaceous plants, generally erect, though some climb by means of their twisting leaf-stalks. Many species are objects of cultivation by the gardener for the sake of their showy flowers. All are astringent and acrid plants, and are reputed diaphoretics and aperients. They inhabit the temperate and warm regions of the northern hemisphere and South Africa.

Fumigation, the application of fumes, gas, or vapour for the purpose of disinfecting houses, clothes, and the like. The fumes of heated vinegar, burning sulphur, or the like, formerly employed, are of but little value. For really active processes see *Disinfectants*.

Fu'mitory, the common name of *Fumaria*, a genus of plants, nat. order Fumariaceæ. Several species are known, natives of Europe and Asia, and two or three are found in Great Britain growing in dry fields and roadsides, and also frequent in highly-cultivated gardens. They are slender annual herbs with much-divided leaves and purplish flowers in racemes at the top of the stem or opposite the leaves. *F. officinālis*, the best-known species, was at one time much used in medicine for scorbutic affections, &c., but its use is now discontinued.

Funaria, a genus of mosses, one of which, *F. hygrometrica*, is common in Britain, especially on spots where a wood-fire has been, and grows in all parts of the world.

Funchal (fu̧n-shäl'), the capital of the Island of Madeira, situated on a bay on the south coast. It stretches for nearly a mile along the shore, and presents a thoroughly European appearance. It is a coaling station for steamers, and is much resorted to by invalids afflicted with pulmonary complaints. Pop. 19,752.

Function, in math. a quantity so connected with another that no change can be made in the latter without producing a corresponding change in the former, in which case the dependent quantity is said to be a *function* of the other; thus, the circumference of a circle is a *function* of the diameter; the area of a triangle is a function of any two of the sides and the angle they contain. In order to indicate in a general way that one quantity y is a function of another x the notation $y=f(x)$, or something similar, is adopted; thus, if u be the area of a triangle, x and y two of the sides, and θ the contained angle, we should write $u=\phi(x, y, \theta)$.

Function, the specific office or action which any organ or system of organs is fitted to perform in the animal or vegetable economy.—*Vital functions*, functions immediately necessary to life, as those of the brain, heart, lungs, &c.—*Natural* or *vegetative functions*, functions less instantly necessary to life, as digestion, absorption, assimilation, expulsion, &c.—*Animal functions*, those which relate to the external world, as the senses, voluntary motions, &c.

Fundamental Note, in music, the lowest or gravest note that a string or pipe can sound.—*Fundamental tones* are the tones from which harmonics are generated.

Fundi, Fun-dungi, a kind of grain allied to millet (the *Paspălum exīle*), much cultivated in the west of Africa. It is light and nutritious, and has been recommended for cultivation in Britain as food for invalids.

Funds, Public, and Funded Debt, money lent to government constituting a national debt. These debts are distinguished as unfunded or floating when they are contracted to be paid off at a specified date;

funded, when the interest only is paid, and the debt itself need never be paid at all. Funding a debt then means simply rendering it irredeemable, or redeemable only at the option of the borrower. Thus there are at present two kinds of funded debt in Great Britain—terminable annuities, in which the payment of interest for a given term of years, or for the life of the annuitant, extinguishes the debt; and permanent funds, upon which interest is due till the redemption of the debt, but in which no period is fixed for redemption. To this class belongs the great bulk of the national debt. A *Sinking fund* is a fund or stock set apart, generally at certain intervals, for the reduction of a debt of a government or corporation.

Fundy, Bay of, a large inlet of the Atlantic, on the east coast of North America, separating Nova Scotia from New Brunswick. At its inner extremity it divides into Chignecto Bay, and Minas Channel and Basin, with smaller continuations. It is noted for its impetuous tides, which cause a rise and fall of from 12 to 70 feet, and the navigation is dangerous. At its entrance are Grand Manan and other islands. A ship-railway is being constructed to connect Chignecto Bay with Northumberland Strait.

Fu'nen (Danish, *Fyen*), the largest of the Danish islands except Seeland, from which it is separated by the Great Belt, and from Jutland by the Little Belt; circuit, about 185 miles; area, 1132 square miles. The interior, towards the west, is covered by a range of low hills, but, with this exception, it is composed of large and fertile plains, under good cultivation. The largest stream is the Odense, which has a course of about 36 miles. The chief towns are Odense, Svendborg, and Nyborg. The population is 221,084.

Funeral Rites, the rites and ceremonies connected with the disposing of the dead. Among the ancient Egyptians the friends of the deceased put on mourning habits, and abstained from gaiety and entertainments for from forty to seventy days, during which time the body was embalmed. Among the ancient Jews great regard was paid to a due performance of the rites of sepulture; and among the ancient Greeks and Romans to be deprived of the proper rites was considered the greatest misfortune that could happen. The decorous interring of the dead with religious ceremonies indicative of hopes of a resurrection is characteristic of all Christian nations. With Roman Catholics the body is the object of solemn ceremonial from the moment of death until interment. The Church of England funeral service is too well known to require any notice. Among other Protestant bodies there is usually no formal service, but prayer is offered up or an ordinary religious service held before the interment in the house of the deceased or his relatives, or, in the case of a public funeral, in some public place. The practice of delivering funeral orations at the interment of the dead by laymen is common in France, and not unfrequent in America. The wake, or watching, is celebrated in some parts of the United Kingdom, particularly in its remoter districts. In Ireland the wake of the lower classes is usually a scene of tumult and drunkenness. For many curious customs at funerals see Brand's Popular Antiquities and Strutt's Manners and Customs; see also *Burial*.

Fünfkirchen (fünf'kir*h*-ėn; 'Five Churches'), a town of the Austrian Empire, in Hungary, on the slope of a hill, 105 miles s.s.w. Budapest. It is the see of a bishop, and the cathedral, a handsome Gothic structure, is one of the oldest ecclesiastical edifices in Hungary. Fünfkirchen once had a flourishing university, attended by 2000 students. Its industries comprise fine pottery, woollens, leather, liqueurs, &c. In the neighbourhood brown coal and black marble are worked. Pop. 34,067.

Fungi (fun'ji), a large natural order of cryptogamous or flowerless plants, comprehending not only the various races of mushrooms, toad-stools, and similar plants, but a large number of microscopic plants growing upon other plants, and substances which are known as moulds, mildew, smut, rust, brand, dry-rot, &c. Fungi agree with algæ and lichens in their cellular structure, which is, with very few exceptions, void of anything resembling vascular tissue; but differ from them in deriving their nutriment from the body on which they grow, not from the medium by which they are surrounded. They are among the lowest forms of vegetable life, and, from the readiness with which they spring up in certain conditions, their germs are supposed to be floating in the atmosphere in incalculable numbers. Some diseases are produced by fungi. Fungi differ from other plants in being nitrogenous in composition, and in inhaling oxygen and giving out carbonic acid gas. Berkeley divides fungi into two great sections, the first

having the spores naked, and comprising agarics, boleti, puff-balls, rust, smut, and mildew; the second comprising the morels, truffles, certain moulds, &c., in which the spores are in sacs (*asci*). These are again subdivided into six principal orders, all formed on the mode in which the spores are borne, namely:—1. *Ascomycetes*, comprising a vast number of the black pustular growths abundant on dead wood, bark, twigs, leaves, &c. Among these are the mildews (*Erysiphe*), the black mildews (*Capnodium*), and the whole great tribe of *Sphæriæ*. The truffles (*Tuber*), morels (*Morchella*), and *Helvella* also belong to this division. 2. *Physomycetes*, a small group comprising the true moulds. 3. *Hyphomycetes*, including the great host of minute moulds which cover almost every substance exposed to dampness. To it also belong the mould of the potato-rot (*Botrytis infestans*) and many which induce decay in fruit (*Oidium*), the bread and cheese moulds (*Penicillium*, *Aspergillus*), and the yeast and vinegar plants, which are submerged mycelia of *Penicillium*. 4. *Coniomycetes*, comprehending the whole family of rusts, smuts, and bunt (*Puccinea*, *Urēdo*, *Ustilāgo*, *Tilletia*, *Æcidium*, &c.). 5. *Gasteromycetes*, including the whole tribe of puff-balls, as well as the subterranean fungi which look like truffles, but are dusty and smutty within. 6. *Hymenomycetes*, typical and well-known examples of which are found in the mushrooms and sap-balls. Fungi occur in every part of the earth where the cold is not too intense to destroy the spawn, though they abound most in moist temperate regions where the summer is warm. Several species afford excellent and abundant food, others are valuable in medicine, while many are among the greatest pests of the cultivator.

Funnel, the shaft or hollow channel of a chimney through which smoke ascends; especially in *steam-ships*, a cylindrical iron chimney for the boiler-furnaces rising above the deck.

Fur and Fur Trade. Fur is the fine soft hairy covering of certain animals, especially the winter covering of animals belonging to northern latitudes. The term fur is sometimes distinctively applied to such coverings when prepared for being made into articles of dress, &c., while the name of peltry is given to them in an unprepared state or when merely dried. The animals chiefly sought after for the sake of their furs are the beaver, raccoon, musk-rat, squirrel, hare, rabbit, the chinchilla, bear (black, gray, and brown), otter, sea-otter, seal, wolf, wolverine or glutton, marten, ermine, lynx, coypou (nutria), polecat (fitch), opossum, fox, &c. (See under proper headings.) All the preparation that skins require before being sent to the market is to make them perfectly dry, so as to prevent them from putrefying. This is done by exposing them to the heat of the sun or a fire. The small skins are sometimes previously steeped in a solution of alum. When stored in large quantities they must be carefully preserved from dampness, as well as from moths. The fur-dresser, on receiving the skins, first subjects them to a softening process. He next cleans them from loose pieces of the integument by scraping them with an iron blade. Finally, the fur is cleaned and combed, after which it is handed over to the cutter, who cuts the furs out into the various shapes required to make different articles.

In Europe the fur trade is fed chiefly by Russia, which yields great quantities of furs, especially in the Asiatic portion of her dominions. Austria, Turkey, Scandinavia, &c., also yield a certain quantity. The fur trade of America has long been highly important, and several great trading companies have engaged in it, of which the Dutch East India Company was first. The French early took up the fur trade in Canada, and their chain of forts and trading posts at one time extended from Hudson's Bay to New Orleans. Quebec and Montreal were at first trading posts. In 1670 Charles II. granted to Prince Rupert and others a charter empowering them to trade exclusively with the aborigines of the Hudson's Bay region. A company, then and after called the *Hudson's Bay Company*, was formed, which for a period of nearly two centuries possessed a monopoly of the fur trade in the vast tract of country known as the Hudson's Bay Territory. In the winter of 1783–84 another company was formed at Montreal, called the *North-west Fur Company*, which disputed the right of the Hudson's Bay Company, and actively opposed it. After a long and bitter rivalry the two companies united in 1821, retaining the name of Hudson's Bay Company. The monopoly which had hitherto been enjoyed by the original company about Hudson's Bay was now much extended; but in 1868 an act of parliament was passed to make provision for the surrender, upon certain terms, of all the territories belonging to the

company, and for their incorporation with the Dominion of Canada. In 1869 the surrender was carried out, Canada paying £300,000 to the company by way of compensation. The company still possesses about 150 houses, forts, and posts in the whole region formerly belonging to it, and its operations, indeed, extend beyond British America into the United States and to the Sandwich Isles and Alaska. It employs directly somewhere about 3000 agents, traders, voyageurs, and servants, besides Indian hunters. Some of its posts are situated very far north, almost approaching the Arctic Ocean. The trade in furs conducted by citizens of the United States has been extensive, but in a greater degree the result of individual enterprise than of the management of gigantic corporations. The Alaska Fur Company holds two of the Aleutian Islands in lease from the U. S. government with the sole right of killing yearly not more than 100,000 fur-seals. The two great centres in Europe to which furs are brought are London and Leipzig.

Furca, FURCAHORN, an Alpine mountain in Switzerland, canton Valais, immediately west of St. Gothard; height, 9935 feet, containing the glacier in which the Rhone has its source. The summit of the Furca Pass, over which there is a good road, is 7992 feet high.

Furies, EUMENIDES, ERINNYES (among the Romans, *Furiæ* and *Diræ*), deities in the Greek mythology, who were the avengers of murder, perjury, and filial ingratitude. Later mythologists reckon three of them, and call them *Alecto*, *Megæra*, and *Tisiphŏnc*. Æschylus, in his celebrated tragedy of the Eumenides, introduced fifty furies, and with them Fear and Horror, upon the stage. They were regarded with great dread, and the Athenians hardly dared to speak their names, but called them the *venerable goddesses*. It was by a similar euphemism the name Eumenides, signifying the soothed or well-pleased goddesses, was introduced. Erinnyes, the more ancient name, signifies the hunters or persecutors of the criminal, or the angry goddesses.

Furlong (that is, 'furrow-length'), a measure of length, 40 rods, poles, or perches, equal to 220 yards, the eighth part of a mile.

Furlough (fėr'lō), a military term signifying leave of absence given by the commanding officer to an officer or soldier under his command.

Furnace, a place where a vehement fire and heat may be made and maintained, as for melting ores or metals, heating the boiler of a steam-engine, warming a house, baking pottery or bread, and other such purposes. Furnaces are constructed in a great variety of ways, according to the different purposes to which they are applied. In constructing furnaces the following objects are kept in view:—(1) To obtain the greatest quantity of heat from a given quantity of fuel. (2) To prevent the dissipation of the heat after it is produced. (3) To concentrate the heat and direct it as much as possible to the substances to be acted upon. (4) To be able to regulate at pleasure the necessary degree of heat and have it wholly under the operator's management. An *air-furnace* is one in which the flames are urged only by the natural draught; a *blast-furnace*, one in which the heat is intensified by the injection of a strong current of air by artificial means; a *reverberatory furnace*, one in which the flames in passing to the chimney are thrown down by a low-arched roof upon the objects which it is intended to expose to their action.

Furneaux Islands (fėr'nō), a group belonging to Tasmania, at the east end of Bass Strait, including Flinders Island with an area of 513,000 acres; Cape Barren Island, 110,000 acres; and Clarke Island, 20,000 acres. On the west the islands have steep rocky shores, but on the east slope gradually down to a low sandy beach, with numerous swamps and lagoons. The inhabitants, who number about 620, many of them 'half-castes,' procure a living by seal-fishing and preserving mutton-birds, a species of petrel. The islands are named after the officer who was second in command in Captain Cook's second voyage.

Fur'ness, a district N. W. Lancashire, forming part of what is called the Lake District. Furness Abbey is a noble ruin situated one mile S. of Dalton-in-Furness, comprising the church walls, chapter-house, refectory, and guest-hall, the whole giving evidence of the former magnificence of the structure. It was founded in 1127 by Stephen, afterwards king of England.

Fur'nivall, FREDERICK JAMES, born at Egham, in Surrey, 1825; educated at University College, London, and Trinity Hall, Cambridge. He has devoted his life chiefly to the study of early and middle English literature; and he has been mainly instrumental in establishing the Early English Text Society, the Chaucer Society, the New

Shakspeare Society, the Browning Society, the Wickliffe Society, and the Shelley Society. He is also hon. secretary of the Philological Society. He has edited numerous works, chiefly through the medium of some of these societies, notably the Six-Text edition of Chaucer's Canterbury Tales.

Furruckabad. See *Farukhabad.*

Fur-seal, a name given to several of the Otariidæ or 'eared' seals which have a dense covering of fine under fur. The best known and most valuable is the fur-seal or sea-bear (*Callorhinus ursinus*) of some of the islands connected with Alaska, especially St. Paul's and St. George's, where it breeds. See *Seal*, also *Fur and Fur-trade.*

Fürst (fürst), JULIUS, orientalist, born of Jewish parents at Zerkowo, Prussian Poland, 1805; died at Leipzig 1873. He devoted himself to philological science, and early showed a marvellously extensive acquaintance with Rabbinical literature. He obtained an appointment as lecturer in the University of Leipzig in 1839, and in 1864 was promoted to the rank of professor. He is the author of numerous works all connected with oriental philology, chief among which are his Concordantiæ Librorum Sacrorum Veteris Testamenti Hebraicæ et Chaldaicæ, and his Hebrew and Chaldee Lexicon. From 1840 to 1851 he edited Der Orient, a journal devoted to Jewish language, literature, history, and antiquities.

Fürstenwalde (fürst'en-vàl-dė), a town in Prussia, 30 miles E.S.E. of Berlin, on the right bank of the Spree. It has a brick church of the 14th century, and manufactures of woollen and linen cloth, hosiery, and leather. Pop. 11,363.

Fürth (fürt), a town in Bavaria, 6 miles W.N.W. of Nürnberg, at the confluence of the Pegnitz with the Rednitz. It has important and varied manufactures, including mirrors, picture-frames, jewelry, gold-leaf, lead pencils, spectacles, machinery, &c. A battle was fought in its neighbourhood in 1632. Pop. 43,206.

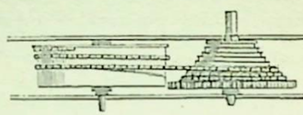
Furze, whin, gorse, the common name of the species of the genus *Ulex*, nat. order Leguminosæ. Twelve species have been described, two of which are natives of Britain. The common furze (*U. europæus*) is a low shrubby plant, very hardy, and very abundant in barren, heathy, sandy, and gravelly soils throughout the west of Europe. The stem is generally 2 or 3 feet high, much branched and most of the leaves converted into spines. The flowers are solitary and yellow. It often covers exclusively large tracts of country, and makes a splendid appearance when in flower. It is used as fuel, and sometimes the tops of the branches are used (especially the young tops) as fodder for horses and cattle, after having been beaten or bruised to soften the prickles. The dwarf-furze (*U. nanus*) is found in many parts of the British Isles.

Fu-San, a town and treaty-port of Corea, situated on a bay of the same name, on the south-east coast.

Fusa'ro, LAKE OF, a small Italian lake on the Peninsula of Baiæ, 11 miles W. of Naples. It is supposed to have been the harbour of ancient Cumæ, and is still celebrated for its oysters.

Fuse, a tube filled with combustible matter, used in blasting, or in discharging hollow projectiles, &c. There are many varieties in use, such as the fuse used in mining and quarrying, which usually consists of a tube filled with a slow-burning composition, which gradually burns down to the charge; the *concussion* and *percussion fuses* for hollow projectiles, which explode the charge when an object is struck; the *electric fuse*, which is ignited by the passage of an electric spark through it; and *time* or *mechanical fuses*, used in some forms of torpedo, and with such explosives as dynamite and gun-cotton.

Fusee', the cone or conical part of a watch or clock, round which is wound the chain or cord. It is a mechanical contrivance for



Barrel and Fusee of a Watch.

equalizing the power of the mainspring; for as the action of a spring varies with its degree of tension, the power derived from the force of a spring requires to be modified according to circumstances before it can become a proper substitute for a uniform power. In order, therefore, to correct this irregular action of the mainspring, the fusee on which the chain or catgut acts is made somewhat conical, so that its radius at every point may be adapted to the strength of the spring.

Fuseli (fū'se-li), JOHN HENRY (original name *Füssli* or *Fuessli;* fūs'lē), a painter, born in 1741 or 1742 at Zürich, died at London, and was buried in St. Paul's Ca-

thedral, 1825. He was educated for the church, but a political pamphlet written by him and Lavater led to his taking refuge in England in 1765, bent on a literary career. On the advice of Sir Joshua Reynolds he devoted himself to art, went to Italy and studied there for nearly nine years. He was elected A.R.A. in 1788, R.A. in 1790, lecturer on painting in 1799, and keeper of the Royal Academy in 1804. Among his notable pictures are his contributions to Boydell's Shakspeare Gallery, and forty-seven pictures from Milton. He had considerable literary gifts, and his lectures on painting are still esteemed.

Fusel-oil, a heavy oily inflammable fluid with a high boiling-point, disagreeable cutting odour, and pungent taste, which is separated in the rectification of ordinary spirit distilled from grain, malt, potatoes, molasses, beet-root, &c. The composition of this fluid depends on the materials used in the manufacture of the spirit, but it may be said to consist to a large extent of ethylic and amylic alcohol ($C_5H_{12}O$). Fusel-oil acts very deleteriously on the animal system, and this is the reason why inferior spirits are so injurious in their effects.

Fusibility. See *Fusing-point*, *Fusion.*

Fusible Metal, an alloy, usually of lead, tin, and bismuth, compounded in such definite proportions as to melt at a given low temperature. In steam-engines, a plug of fusible metal is placed in the skin of the boiler, so as to melt and allow the steam to escape when a dangerous heat is reached.

Fusible Porcelain, a silicate of alumina and soda obtained from cryolite and sand, fused and worked as glass.

Fusiliers, formerly soldiers armed with a fusil or light flint-lock musket closely resembling a carabine. The name is given to nine or ten regiments in the British army, which differ from other regiments of the line chiefly in the busby worn by officers and non-commissioned officers.

Fusing-point, the degree of temperature at which a substance melts or liquefies. This point is very different for different metals. Thus potassium fuses at 136° Fahr., bismuth at 504°, lead at 619°, zinc at 680°, silver 1832°, gold 2282°. Malleable iron requires the highest heat of a smith's forge (2912°); while cerium, platinum, and some other metals are infusible in the heat of a smith's forge, but are fusible before the oxy-hydrogen blow-pipe.

Fusion, the conversion of a solid body into the liquid state by direct heat, as distinguished from solution in which the effect is produced by means of a liquid. It is difficult, however, to draw a line between the two, for the main difference is in the temperature, and when a flux is employed all distinction disappears. The term is specially applied to the action of heat on the metals, but it is extended to any solid matter; thus the passage of ice into water at 32° F. is true fusion. There are bodies like carbon, lime, magnesia, zirconia, and other metallic oxides, which are practically, if not absolutely, infusible. See *Fusing-point.*

Fusi-Yama. See *Fuji-Yama.*

Fust, Johann, a goldsmith of Mainz, associated with Gutenberg and Schöffer in connection with the origin of printing. He probably died of the plague in 1466. See *Printing.*

Fustian, a cotton or mixed linen and cotton fabric with a pile like that of velvet but shorter. It includes corduroy, moleskin, velveteen, &c.

Fustic, the wood of the *Maclura tinctoria*, a tree of the mulberry order growing in the West Indies. It is a large and handsome tree, and the timber, though, like most other dye-woods, brittle, or at least easily splintered, is hard and strong. It is extensively used as an ingredient in the dyeing of yellow, and is largely imported for that purpose.—*Young Fustic* is the wood of the *Rhus cotinus* or Venice sumach, a South European shrub with smooth leaves and a remarkable feathery inflorescence. It yields a fine orange colour, which, however, is not durable without a mordant.

Fusus, a genus of gasteropodous molluscs nearly allied to *Murex*, with a somewhat spindle-shaped univalve shell. The genus comprises many species. The red whelk of England, the 'roaring buckie' of the Scotch, is the *F. antiquus.*

Futehpur. See *Fatehpur.*

Futhork (fu'thork), the name given to the earliest or runic alphabet in use among the Teutonic and Gothic nations of northern Europe, so called from its first six letters, f, u, th, o, r, k. See *Runes.*

Futtipur Sikra. See *Fatehpur Sikra.*

Futtygurh. See *Fategarh.*

Fyne (fīn), Loch, an arm of the sea in Scotland, in the county of Argyle, running northwards from the Firth of Clyde for about 40 miles. Its depth varies from 12 to 50 fathoms. It is particularly celebrated for its herrings.

Fyrd (fůrd), in Anglo-Saxon England the military array or land force of the whole nation, comprising all males able to bear arms. The array of the fyrd of each shire was left to the ealdorman.

Fyt (fit), JOHN, a Dutch painter and etcher, born at Antwerp in 1611, died there 1661. His subjects were chiefly game, hunting pieces, dogs, fruit, flowers, &c. His pictures are common. He published two series of etchings of animals.

Fyzabad, or FAIZABAD (fi-zä-bäd'), a town, British India, in what was formerly the kingdom of Oude, on the Gogra, 78 miles E. from Lucknow. It was the scene of one of the outbreaks in the Indian rebellion of 1857. Pop. 38,828, or including cantonments 43,927.

G.

G, the seventh letter in the English alphabet. English *g hard* is a guttural mute, the 'voiced' or soft or sonant sound corresponding to the 'breathed' or hard or surd sound *k* (or *c* hard). This sound of *g* is what the letter always has before *a* (except in *gaol*), *o*, *u*, and when initial also before *e* and *i* in all words of English origin, and when final. The *soft* sound of *g*, or that which it more commonly has before *e*, *i*, and *y*, as in *gem*, *gin*, *gymnastics*, is a palatal sound the same as that of *j*, and did not occur in the oldest English or Anglo-Saxon.

G, in music, (*a*) the fifth note, and dominant of the normal scale of C, called also *sol;* (*b*) the lowest note of the grave hexachord; in the Guidonian system *gamma ut;* (*c*) a name of the treble clef, which is seated on the G or second line of the treble staff, and which formerly had the form of G.

Gabbro, the name given by the Italians to a rock consisting essentially of diallage and white epidote or saussurite. It is used for ornamental purposes in building, for table-tops, &c.

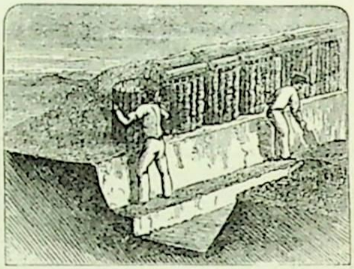
Gabbronite, GABRONITE, a mineral, a variety of scapolite, occurring in masses, whose structure is more or less foliated, or sometimes compact. Its colours are gray, bluish or greenish gray, and sometimes red.

Gabelle', a name originally given in France to every kind of indirect tax, as on wine, cloth, &c., but at a later period specially applied to the tax upon salt, which after being frequently imposed as a temporary means of raising money, became under Charles V. a permanent impost. Under Henry II. nine provinces and three counties purchased perpetual exemption from the tax, but it was only finally suppressed in France by the Constituent Assembly in 1790. About that time, out of 38,000,000 livres raised by farmers-general from this tax, 7,000,000 at most came into the treasury.

Gabes. Same as *Cabes.*

Gabilla (gä-bēl'yä), a finger or parcel of tobacco in Cuba. Thirty-six to 40 leaves make a *gabilla*, 4 *gabillas* 1 *hand*, 80 *hands* 1 *bale.*

Ga'bion, a large wickerwork basket of cylindrical form, but without bottom. In a siege, when forming a trench, a row of gabions is placed on the outside nearest the



Part of Trench with Gabions and Fascines.

fortress, and filled with earth as it is thrown from the trench, so as to form a protection against the fire of the besieged. Each gabion is about 20 inches in diameter and 33 inches in height, but this height is usually increased by placing a row of fascines on the top after the interior has been filled up.

Gable, the triangular end of a house or other building, from the eaves to the top, and distinguished from a pediment by this, among other things, that it has no cornices.

Gaboon', THE, or M'PONGO, an estuary on the west coast of Africa, opening from the Gulf of Guinea immediately north of the equator. Several rivers discharge themselves into it. The Gaboon territory forms part of the French Congo territory. The chief tribes are the Mpongwa or Gabonese, and the Fans, who carry on an active trade with

Europeans in ivory, copal, ebony, dyewoods, &c. The vast swamps render the climate unhealthy, but inland rise some considerable hills with dense jungle-like woods, the abode of the gorilla. The chief station is Libreville. There are several English trading-posts along the estuary (Glass Town, Olemi, &c.), and mission stations of several nations.

Gaboriau, Émile, a French novelist, born 1834, died in Paris 1873. After contributing to the smaller Parisian journals short sketches published under the titles Ruses d'Amour, Les Comédiennes Adorées, &c., he achieved a considerable success by his novel Dossier No. 113 (1866). He continued to work this vein in a series of clever stories dealing with crime and its detection: Le Crime d'Orcival, L'Affaire Lerouge, Les Esclaves de Paris, La Vie Infernale, La Corde au Cou, L'Argent des Autres, &c.

Gab'riel ('hero or man of God'), according to Biblical history, the angel who announced to Zacharias the birth of John, and to Mary the birth of the Saviour. In Jewish mythology he is one of the seven archangels. The rabbins say he is the angel of death for the Israelites, and according to the Talmud he is a prince of fire, who presides over thunder and the ripening of fruits. In Mohammedan theology he is one of the four angels employed in writing the divine decrees, and the angel of revelation, in which capacity he dictated the Koran to Mohammed.

Gad ('a troop'), one of the twelve tribes of Israel, which took its name from Gad, the son of Jacob and Zillah. At the time of the exŏdus the tribe numbered 45,650 men of twenty years old and upwards; and as being a pastoral tribe they were assigned a rich district in Gilead between Reuben and Manasseh. See Josh. xiii. 24–28.

Gadames. See *Ghadames*.

Gad'ara, an ancient city of Syria, in the Decapolis, about 6 miles S.E. of the Sea of Galilee. It played an important part in the struggles against Antiochus, Alexander Jannæus, and Vespasian, and only fell into decay after the Mohammedan conquest.

Gaddi, (1) Gaddo, a Florentine worker in mosaic and founder of the modern mosaic art, born 1249, died 1312.—(2) Taddeo, an artist, son of preceding, born 1300, died 1360. His works are among the best examples of 14th-century art, his decorations of the Church of Santa Maria Novella at Florence being specially noteworthy.—(3) Agnolo, son of Taddeo, born 1324, died 1390. His style was compounded from his father and Giotto, and he has been called the founder of the Venetian school.

Gade (gä'de), Niels Wilhelm, one of the leading Scandinavian composers, born in 1817 at Copenhagen, where, in 1841, by his overture entitled Echoes of Ossian, he gained the prize of the Musical Union. He was supported during his studies abroad by a royal stipend, and in 1844 was appointed to succeed Mendelssohn in the direction of the Gewandhaus concerts at Leipzig. In 1850 he was appointed musical director to the King of Denmark, and in 1876 received a life pension. His works, which are Mendelssohnian in character, include seven symphonies, several overtures, sonatas, quintets, &c.; a lyrical drama—Comala; a religious cantata—The Crusaders; an opera—the Nibelungen; &c. He died in 1890.

Ga'des, the ancient name of Cadiz.

Gadfly, a name commonly applied to various insects, a large number of which belong to the great Linnæan genus *Œstrus*, while others belong to the genus *Tabănus*. *Œ. bovis* or ox gadfly (the *Hypoderma bovis* of some naturalists) is about 7 lines in length; thorax yellow, with a black band; abdomen white; terminal segments fulvous; wings dusky. This species attacks the horse also, the female depositing her eggs in the skin of these animals in considerable numbers. In a short time the eggs are matured, and produce a *larva* or worm, which immediately pierces the skin, raising large lumps or tumours filled with pus, upon which the larva feeds. *Œ. equi* (the *Gastrophilus* or *Gastrus equi* of some naturalists) deposits its eggs upon such parts of the skin of horses as are subject to be much licked by the animal, and thus they are conveyed to the stomach, where the heat speedily hatches the larvæ, too well known under the name of *botts*. *Œ. ovis* (also called *Cephalomyia ovis*) deposits its eggs in the nostrils of sheep, where the larva is hatched, and immediately ascends into the frontal sinuses, attaching itself very firmly to the lining membrane by means of two strong hooks situated at its mouth. Other species infest the buffalo, camel, stag, &c. Even rhinoceroses and elephants are said not to be altogether exempt from their attacks. The characteristics of the genus *Tabănus* are two enormous eyes, usually of a greenish-yellow colour rayed or spotted with purple, antennæ scarcely longer than the head, the last joint with five divisions. These insects suck the blood of horned cattle, horses, and some-

times even of men. The *T. bovinus*, or large gadfly, is common in Europe, more common in England than in Scotland. It is about an inch in length, brown above, gray below. Its larva lives on the ground, and its metamorphoses take place under the earth, but close to the surface.

Gad'idæ, a family of malacopterous fishes, which includes the cod, ling, haddock, &c. See *Cod*.

Gad'olinite, a mineral, a silicate of yttrium, with a considerable proportion of lime and magnesia, of the oxides of iron, cerium, lanthanum, glucinum, and sometimes of other bases. It is usually found in dull, amorphous masses disseminated through granite; is black, or very dark green, with a resinous lustre. It was named after the mineralogist Gadolin, professor at Åbo, 1785–1822.

Gadwall', the common name of *Anas strepera*, a species of duck not so large as the mallard, with long pointed wings and a vigorous and rapid flight. North America as far down as South Carolina is its favourite habitat; in Britain and Ireland it is rare.

Gaedhelic (gā'el-ik). See *Gael*.

Gaekwar, or Gaikwar (gīk-wär'). See *Baroda*.

Gael (gāl), the name of a branch of the Celts inhabiting the Highlands of Scotland, Ireland, and the Isle of Man. Gadhel or Gael is the only name by which those who speak the Gaelic language are known to themselves. By way of distinction the Highlanders of Scotland call themselves Gael Albinnich (Gaels of Albin) and the Celtic population of Ireland call themselves Gael Erinnich (Gaels of Erin).

Gaelic is the name now generally restricted to that dialect of the Celtic language which is spoken in the Highlands of Scotland, and hence distinguished from Manx and Irish, the other two kindred dialects, which scholars of the present day include under the name (or rather spelling) Gaedhelic. The modern Gaelic differs to some extent from the Irish in pronunciation, in grammar, in idioms, and in vocabulary. The literature of the Gaelic language is somewhat scanty, and is much less ancient and important than the Irish. The earliest written specimens of Gaelic are scraps contained in the Book of Deer, a religious manual belonging to the early part of the 12th century. To the 14th and 15th centuries a considerable number of pieces belong. A collection of the older poetry, ascribed to Ossian and others, was made in the first half of the 16th century by Sir James Macgregor, dean of Lismore —hence called 'The Dean of Lismore's Book.' Robert Calder Mackay, or Robb Donn, and Duncan Ban M'Intyre, of Glenorchy, are the two most noteworthy poets among the Scottish Highlanders in modern times. They both belong to the 18th century. This century also saw the publication of the Bible in Gaelic, the Irish Bible having been previously well known in the Highlands. The so-called poems of Ossian appeared about the same time, but in English, and it was not till 1818 that the corresponding Gaelic text appeared. A series of tales and legends of the Highlands of Scotland have been collected and published by J. F. Campbell. Various English works have been translated into Gaelic, and several collections of Gaelic poetry have been published in the present century, as well as Gaelic periodicals. Gaelic poetry still continues to be written not only in Scotland but even in America.

Gaëta (gå-ā'tå; anciently *Caieta*), a strongly-fortified seaport town of S. Italy, province of Terra di Lavoro, on the Gulf of Gaëta, the seat of a bishop, 45 miles north-west of Naples. It is a place of great antiquity, was a favourite resort of the wealthy families of Rome, and since the 5th century has had a prominent place in the history of Italy, and especially in that of the Kingdom of Naples. Pop. 16,880.

Gætulia, the ancient name of an extensive region of Africa, on the southern slope of Mount Atlas. It corresponds to the modern Biledulgerid, the southern part of Marocco, and the northern part of the Sahara. It was inhabited by warlike tribes, who are supposed to be the ancestors of the modern Tuaregs of the Sahara oases.

Gaff, a spar used in ships to extend the upper edge of fore-and-aft sails which are not set on stays. The fore-end of the gaff, where it embraces the mast, is termed the *jaw*, the outer end the *peak*. The jaw forms a semicircle, and is secured in its position by a jaw-rope passing round the mast.

Gahn (gän), Johann Gottlieb, a Swedish chemist, born in 1745, died in 1818. In his chemical work he was associated with Bergman, Scheele, and Berzelius. He left an account of the blow-pipe and its application.

Gahnite, a name given to automolite after Gahn. It is a native aluminate of zinc, crystallizes in octa- and tetra-hedrons, is of dark green or black colour, and is not

affected by the blow-pipe, or by acids or alkalies.

Gaillac (gá-yák), a town of Southern France, department of Tarn, on the right bank of the Tarn. It exports a good red table-wine, the district abounding in vineyards. Pop. 7834.

Gaillarde (gá-yärd; Italian, *Gagliarda*), a lively Italian dance, in triple time; also called, from its alleged origin, *Romanesque*.

Gainsborough, a market town, England, county of Lincoln, 15 miles north-west of the town of Lincoln, on the Trent, which is navigable by vessels of from 150 to 200 tons, and is connected with the extensive canal navigation established to Manchester, Liverpool, Gloucester, Bristol, London, &c. Among the chief buildings are the parish church, the town-hall, and the old hall or manor-house, containing the assembly-rooms and mechanics' institute—a large quaint building, supposed to have been partly built by John of Gaunt. There are oil-mills, breweries, malt-houses, &c. Gainsborough gives name to a parl. div. of the county. Pop. (1891), 14,372.

Gainsborough, Thomas, an English painter, was born at Sudbury, in Suffolk, in 1727. He was trained under the engraver Gravelot and the painter Hayman, but met with small success till his marriage with Miss Burr, a lady of beauty and fortune, in 1746. After residing for some time in Ipswich and Bath, he went in 1774 to London, where he passed the rest of his life. He was one of the original thirty-six academicians. He rivalled Sir Joshua Reynolds as a portrait-painter, and showed no less originality in landscape. His works are now very highly esteemed, more so than at any previous time. His death took place in 1788.

Gaius, or Caius, a Roman lawyer of the time of Adrian and Antoninus Pius, of whose life very little is known. Of his numerous works, his Institutes are particularly important; first, as having been for centuries, down to the time of Justinian, one of the most common manuals of law; secondly, as having been the foundation of the official compendium of the law which occupies an important place in the reform of the judicial system by Justinian; and thirdly, as the only tolerably full, systematic, and well-arranged source of the old Roman law. The bulk of the work in MS. was discovered in 1816 by Niebuhr.

Galactodendron. See *Cow-tree.*

Galactometer. See *Lactometer.*

Galactose ($C_6H_{12}O_6$), a variety of sugar produced by boiling milk-sugar or lactose ($C_{12}H_{24}O_{11}$) with dilute sulphuric acid.

Galacz. See *Galatz.*

Galago (ga-lā'go), the native name of a genus of quadrumanous mammals found in Africa. The species, which are nocturnal in their habits, have long hind-legs, great eyes, and large membranous ears. The great galago (*G. crassicaudatus*) is as large as a rabbit. They live in trees, and are sought after as food in Africa.

Galan'ga, or Galangal Root, a dried rhizome brought from China and used in medicine, being an aromatic stimulant of the nature of ginger. It is mostly produced by *Alpinia officinarum*, a flag-like plant about 4 feet high, with narrow lanceolate leaves and simple racemes of white flowers. The greater galangal is the rhizome of *A. Galanga.*

Galap'agos (the Spanish for 'tortoises'), a group of thirteen islands of volcanic origin in the North Pacific Ocean, about 600 miles west of the coast of Ecuador, to which they belong; area, 2950 square miles. The most important are Albemarle, 60 miles long by 15 broad, and rising 4700 feet above the sea; Indefatigable, Chatham, Charles, James, and Narborough. Of these some are used by the Republic of Ecuador as penal settlements. Many of the fauna and flora of the islands are peculiar to them, the most remarkable being a large lizard and the elephant tortoise.

Galashiels (gal-a-shēlz'), a town in Scotland, one of the Hawick district of parliamentary burghs, in the county of Selkirk, on both sides of the Gala, about a mile above its confluence with the Tweed, 3½ miles from Melrose, and 27 miles s.s.e. of Edinburgh. It is noted for its manufactures of tweeds, plaids, shawls, woollen yarns, &c. The town, which is of rather irregular construction, lies in a narrow valley, and is about 2 miles long. Pop. 17,367.

Galate'a, in classic mythology, the daughter of Nereus and Doris, who rejected the suit of the Cyclops Polyphemus and gave herself to the Sicilian shepherd Acis. The monster having surprised them crushed Acis beneath a rock.

Galatia, the ancient name of an extensive region in Asia Minor, so called from its Gallic inhabitants, who in the first place formed part of the invading hordes of Gauls under Brennus in the 3d century B.C. These were compelled by Attalus, king of Perga-

mos, to settle within well-defined limits between Paphlagonia, Pontus, Cappadocia, Lycaonia, Phrygia, and Bithynia. With the Gauls were intermingled a considerable proportion of Greeks; hence the inhabitants were often called Gallogræci, as well as Galatians.

Galatians, Epistle to the, one of the most important epistles of St. Paul, written probably about 56 A.D., soon after his second visit to Galatia, recorded in Acts xviii. 23. It was directed against the spread of Judaistic practices in the Galatian churches and especially against the practice of circumcision. It has been the subject of numerous commentaries by Luther, Winer, Meyer, Ellicott, Alford, and others.

Galati'na, San Pietro in, a town of South Italy, in the province of Lecce and 16 miles west of Otranto. Pop. 8720.

Galatz, or Galacz, a town and port in Roumania, in Moldavia, on the left bank of the Danube, between the confluence of the Sereth and Pruth. It consists of an old and a new town, the latter on a hill dominating the river and commanding a fine view of the Balkans. The harbour, accessible to vessels drawing 15 feet, is well frequented, and an emporium of trade between Austria, Russia, and Constantinople. The trade was formerly entirely in the hands of the Greeks, but now many English and other foreign houses have established themselves. The chief exports are grain (principally maize), wine, planks and deals, tallow, &c. The imports are chiefly British manufactures, sugar, tin plates, iron and steel, coal, oil, fruits, tobacco, fish, glass-ware, leather, coarse cloth. When made a free port in 1834 it had only 8000 inhabitants, but the population has since grown to 80,000. It ceased to be a free port in 1883.

Gal'axy (*Via Lactea*, or Milky Way), in astronomy, that long luminous track which is seen at night stretching across the heavens from horizon to horizon, and which, when fully traced, is found to encompass the heavenly sphere like a girdle. This luminous appearance is occasioned by a multitude of stars so distant and blended as to be distinguishable only by the most powerful telescopes. At one part of its course it divides into two great branches, which remain apart for a distance of 150° and then reunite; there are also many other smaller branches that it gives off. At one point it spreads out very widely, exhibiting a fan-like expanse of interlacing branches nearly 20° broad; this terminates abruptly and leaves here a kind of gap. At several points are seen dark spots in the midst of some of the brightest portions; one of the most easily distinguished of these dark spots has long been known as the 'coal-sack.' According to Herschel's hypothesis, our sun and planetary system form part of the Milky Way.

Galba, Servius Sulpicius, Roman emperor, successor of Nero, born B.C. 3. He was made prætor (A.D. 20), and afterwards governor of Aquitania, and in A.D. 33 was raised to the consulship through the influence of Livia Drusilla, the wife of Augustus. Caligula appointed him general in Germany, and Claudius sent him in A.D. 45 as proconsul to Africa, his services there obtaining him the honours of a triumph. He then lived in retirement till the middle of Nero's reign, when the emperor appointed him governor of Hispania Tarraconensis, but soon after ordered him to be secretly assassinated. Galba revolted; the death of Nero followed (A.D. 68), and he himself was chosen emperor by the prætorian cohorts in Rome. He went directly to Rome, but soon made himself unpopular by cruelty and avarice, and he was slain in the forum in A.D. 69 at the age of seventy-two.

Gal'banum, Galban, a fetid gum resin procured from at least two species of umbelliferous plants, which are probably *Ferŭla galbaniflŭa* and *F. rubricaulis*. It consists of the 'tears' of gum resin which exude spontaneously from the stem, especially in its lower part and about the bases of the leaves. It is brought from the Levant, Persia, and India, and is administered internally as a stimulating expectorant. It is also used in the arts, as in the manufacture of varnish. It is supposed to be yielded by other umbellifers, among which are named *Ferulāgo galbanifĕra*, *Opoidia galbanifĕra*, and *Bubon Galbanum*.

Galbuli'næ, the jacamars, a family of tropical American fissirostral birds allied to the trogons and kingfishers.

Gale, a plant of the genus *Myrīca*, nat. order Myricaceæ. Sweet gale or bog-myrtle (*M. Gale*) is a shrub from 1 to 3 feet high, which exhales a rather pleasant aromatic odour, and grows on wet heaths abundantly. In America the name is applied to an allied plant *Comptonia asplenifolia*. See also *Candleberry*.

Galeidæ (ga-lē'i-dē), the topes, a family of small sharks. Two species, the common tope (*Galeus canis*) and the smooth hound

(*Mustēlus vulgāris*), are abundant in British seas.

Gale'mys, a genus of mammals allied to the shrews. Only two species are known, the Russian desman or musk-rat (*G. moschata*) and the French desman (*G. pyrenaica*). They live in burrows at the side of streams, and feed on insects. See *Musk-rat*.

Galen, properly CLAUDIUS GALENUS, a Greek physician, born A.D. 130, at Pergamus in Asia Minor. His father, Nicon, an architect and mathematician, gave him a careful education, and he studied under physicians in Smyrna, Corinth, Alexandria, &c., afterwards visiting Cilicia, Phœnicia, and Palestine. He returned in 103 to Pergamus, where he received a public appointment, but five years later went to Rome, and there acquired great celebrity by his cures. Driven thence by envy, he again travelled for some time and resumed his labours in his native town, but was soon after invited to Aquileia by the Emperors Marcus Aurelius and Lucius Verus (A.D. 169). He followed Marcus Aurelius to Rome, and appears to have remained there for some years before finally retiring to Pergamus. The closing part of his life, however, is obscure. One Arabic writer says that he died in Sicily, and Suidas states that he died at the age of seventy, and accordingly in the year A.D. 200 or 201; but it is not improbable that he lived longer. The writings attributed to Galen include eighty-three treatises acknowledged to be genuine, forty-five manifestly spurious; nineteen of doubtful genuineness, and fifteen commentaries on different works of Hippocrates, besides a large number of short pieces and fragments, probably in great part spurious. The most valuable of his works were those dealing with anatomy and physiology, and he was the first to establish the consultation of the pulse in diagnosis and prognosis. Till the middle of the 16th century his authority in medicine was supreme.

Gale'na (Pb S), the sulphide of lead, found both in masses and crystallized in cubes, but sometimes in truncated octahedra; its colour is bluish-gray, like lead, but brighter; lustre metallic; texture foliated; fragments cubical; soft, but brittle; specific gravity, 7·22 to 7·759; effervesces with nitric and hydrochloric acids. For the most part it contains about 86·6 per cent of lead and 13·4 of sulphur, generally some silver, and also antimony, zinc, iron, and bismuth. Where the proportion of silver is high it is known as *argentiferous galena*, and worked with a view to the extraction of this metal. Galena occurs principally in the older or primary rocks, being found in England mainly in the Mountain Limestone (base of the Carboniferous formation). In the U. States it is very abundant, the deposit of galena in which the mines of Illinois are situated being the most extensive and important hitherto discovered.

Gale'na, a town of the United States, in Illinois, near the borders of Wisconsin, in the great lead region, situated on both sides of the Fevre river, 6 miles above its junction with the Mississippi. The staple is lead, after the abundant ore of which (galena, see above) the town is named. Pop. 5635.

Ga'lenists, the name of the body of controversialists who, appealing to the authority of Galen, opposed the introduction of chemical and alchemical methods of treatment into medicine. They adhered to the ancient formulas, which prescribed preparations of herbs and roots by infusion, decoction, &c., while the chemists professed to extract essences and quintessences by calcination, digestion, fermentation, &c. Neither body possessed a monopoly of the truth, and modern medicine combines the better elements in each method.

Galeopithe'cus. See *Flying-lemur.*

Galeop'sis, the generic name of the hemp-nettles, a genus of plants, of the nat. order Labiatæ, characterized by the equally five-toothed calyx. They are herbaceous plants with square stems, usually clothed with sharp bristly hairs, nettle-like leaves on long stalks, and red, white, or yellow labiate flowers. There are about twelve species, three of which are natives of Britain. The handsomest of these (*G. versicolor*) is abundant in Scotland, especially in the Highlands; it has showy yellow flowers, with a broad purple spot on the lower lip.

Galerius, a Roman emperor. See *Maximianus.*

Galesburg, a city of the United States, in Knox county, Illinois. It has railroad workshops, iron-foundries, manufactures of agricultural implements, &c. Knox College and Lombard University are situated here. Pop. 15,264.

Galicia, KINGDOM OF, a province of Austria, bounded by Russia, Bukowina, Hungary, and Moravia; area, 30,312 square miles; pop. (Polish in the west, Russniak in the east) 6,607,816. The great physical

features of the country are, in a manner, determined by the Carpathians, which form a long and irregular curve on the south, and send out branches into Galicia. Farther to the north the hills subside rapidly, and finally merge into vast plains. It has several considerable rivers, those on the west being affluents of the Vistula, those in the east, of the Danube and Dniester. The climate is severe, particularly in the south, where more than one of the Carpathian summits rise beyond the snow-line. The summers are very warm but comparatively short. The soil in general is fertile, and yields abundant crops of cereals, hemp, flax, tobacco, &c. The domestic animals include great numbers of horned cattle, and a fine hardy breed of horses. Sheep are in general neglected; but goats, swine, and poultry abound, and bee-keeping is practised on a large scale. Bears and wolves are still found in the forests; and all the lesser kinds of game are in abundance. The minerals include marble, alabaster, copper, calamine, coal, iron, and rock-salt. Only the last two are of much importance. Rock-salt is particularly abundant. The most important mines have their central locality at Wieliczka. Manufactures have not made much progress. The spinning and weaving of flax and hemp prevail to a considerable extent on the confines of Silesia. Distilleries exist in every quarter. The Roman Catholics and the Greek Catholics are the chief religious bodies. The chief educational establishments are the University of Lemberg and that of Cracow. The principal towns are Lemberg, the capital, and Cracow. After being the field of continuous strife between Russians, Poles, and Hungarians, Galicia continued a Polish dependency from 1382 until the first partition of Poland, in 1772, when it was acquired by Austria. Galicia is now one of the Cis-Leithan provinces of the Austrian Empire, and is represented in the *Reichsrath* by 63 deputies, while the affairs peculiar to itself are deliberated and determined upon by its own *Landtag* or Diet. Polish is the language of official intercourse and of the higher educational institutions. Pop.

Galicia, one of the old provinces of Spain, situated in the N.W., and bounded N. and W. by the Atlantic, S. by Portugal, and E. by the old provinces of Asturias and Leon. It is now divided into the provinces of Coruña, Lugo, Orense, and Pontevedra; area, 11,212 square miles. Its broken coast, which has a length of about 240 miles, lies open to the Atlantic, and there are a number of fine natural harbours, of which Ferrol is one of the finest naval ports in Europe. The surface is mountainous, and the proportion of good arable land limited; but fruit, particularly apples and pears, nuts, walnuts, and chestnuts, is abundant; and the culture of the vine is common in all the lower districts. The higher mountain slopes are generally covered with fine forests, which feed large herds of swine, and afford haunts to boars and wolves. Both manufactures and trade are insignificant. The chief town is Santiago de Compostella. The natives (Gallegos) speak an uncouth patois, which other Spaniards scarcely understand. The peasantry are very poor, and many leave for service in other parts of Spain. Pop. 1,881,000.

Gal′ilee, in the time of Jesus Christ, the most northern province of Palestine, bounded on the E. by the river Jordan, on the S. by Samaria, on the W. by the Mediterranean Sea and Phœnicia, and on the N. by Syria and the Mountains of Lebanon. It was in some sense the cradle of Christianity, Nazareth, Cana, Capernaum, Nain, and other places being intimately associated with the life of Christ. The inhabitants of this country, mostly poor fishermen, on account of their ignorance and simplicity of manners were despised by the Jews, who, by way of contempt, called Christians, at first, *Galileans*. At present Galilee is included in the vilayet of Syria.

Gal′ilee, a portico or chapel annexed to a church, used for various purposes. In it public penitents were stationed, dead bodies deposited previously to their interment, and religious processions formed; and it was only in the galilee that in certain religious houses the female relatives of the monks were allowed to converse with them, or even to attend divine service. The only English buildings to which the term galilee is applied are attached to the cathedrals of Durham, Ely, and Lincoln.

Galilee, Sea of, also called Sea of Chinnereth or Chinneroth, and the Lake of Gennesaret or Tiberias, a pear-shaped fresh-water lake in Central Palestine, 12½ miles long by 7½ broad. It was apparently formed by subsidence attended with volcanic disturbance; and is 682 feet below the level of the Mediterranean. On the east the coasts are nearly 2000 feet high, deeply furrowed by ravines but flat along the summit. The whole basin is bleak and monotonous, and

has a scathed volcanic look, the cliffs and rocks along the shore being of hard porous basalt. At the time of Christ there were on its shores nine flourishing cities, of which seven are now uninhabited ruins, while Magdala and Tiberias are both in a poverty-stricken condition. The lake still abounds in fish, but the fishery is neglected.

Galilei (gál-i-lā'ē), GALILEO, a most distinguished Italian physicist, born 18th Feb. 1564, at Pisa. His father Vincenzo Galilei, a nobleman of Florence, procured him an excellent education in literature and the arts, and in 1581 he entered the University of Pisa. At nineteen the swinging of a lamp in Pisa cathedral led him to investigate the laws of the oscillation of the pendulum, which he subsequently applied in the measurement of time; and in 1586 the works of Archimedes suggested his invention of the hydrostatic balance. He now devoted his attention exclusively to mathematics and natural science, and in 1589 was made professor of mathematics in the University of Pisa. In 1592 he was appointed professor of mathematics in Padua, where he continued eighteen years, and his lectures acquired European fame. Here he made the important discovery that the spaces through which a body falls, in equal times, increase as the numbers 1, 3, 5, 7. If he did not invent he improved the thermometer, and made some interesting observations on the magnet. To the telescope, which in Holland remained not only imperfect but useless, he gave a new importance. He noted the irregularity of the moon's surface, and taught his scholars to measure the height of its mountains by their shadow. A particular nebula he resolved into individual stars, and conjectured that the Milky Way might be resolved in the same manner. His most remarkable discovery was that of Jupiter's satellites (1610), and he observed, though imperfectly, the ring of Saturn. He also detected the sun's spots, and inferred, from their regular advance from east to west, the rotation of the sun, and the inclination of its axis to the plane of the ecliptic. In 1610 Cosmo II., grand-duke of Tuscany, appointed him grand-ducal mathematician and philosopher, and with increased leisure he lived sometimes in Florence, and sometimes at the country seat of his friend Salviata, where he gained a decisive victory for the Copernican system by the discovery of the varying phases of Mercury, Venus, and Mars. In 1611 he visited Rome for the first time, where he was honourably received; but on his return to Florence he became more and more involved in controversy, which gradually took a theological turn. The monks preached against him, and in 1616 he found himself again obliged to proceed to Rome, where he is doubtfully said to have pledged himself to abstain from promulgating his astronomical views. In 1623 Galileo replied to an attack upon him in his *Saggiatore*, a masterpiece of eloquence, which drew upon him the fury of the Jesuits. In 1632, with the permission of the pope, he published a dialogue expounding the Copernican system as against the Ptolemaic. A congregation of cardinals, monks, and mathematicians, all sworn enemies of Galileo, examined his work, condemned it as highly dangerous, and summoned him before the tribunal of the Inquisition. The veteran philosopher was compelled to go to Rome early in 1633, and was condemned to renounce upon his knees the truths he had maintained. At the moment when he arose, he is said (but this is doubtful) to have exclaimed, in an undertone, stamping his foot, '*E pur si muove!*' (and yet it moves!). Upon this he was sentenced to the dungeons of the Inquisition for an indefinite time, and every week, for three years, was to repeat the seven penitential psalms of David. After a few days' detention his sentence of imprisonment was commuted to banishment to the villa of the Grand-duke of Tuscany at Rome, and then to the archiepiscopal palace at Sienna. He was afterwards allowed to return to his residence at Arcetri, near Florence, where he employed his last years principally in the study of mechanics and projectiles. The results are found in two important works on the laws of motion, the foundation of the present system of physics and astronomy. At the same time he tried to make use of Jupiter's satellites for the calculation of longitudes; and though he brought nothing to perfection in this branch, he was the first who reflected systematically on such a method of fixing geographical longitudes. He was at this time afflicted with a disease in his eyes, one of which was wholly blind and the other almost useless, when, in 1637, he discovered the libration of the moon. Domestic troubles and disease embittered the last years of Galileo's life. He died 8th Jan. 1642 (the year Newton was born). His remains were ultimately deposited in the church of Sta. Croce, at Florence.

Gal'ingale, a name applied to a kind of sedge, the *Cypĕrus longus*, or to its tubers, which contain a bitter principle, and have tonic and stomachic properties. They also yield a perfume. See *Cyperus*.

Gal'ipot, or FRENCH TURPENTINE, the long, soft stalactitic pieces of resin which form down the sides of the *Pinus maritima* by evaporation of part of the volatile oil.

Gall, in the animal economy. See *Gall-bladder*, *Bile*.

Gall, FRANZ JOSEPH, the founder of phrenology, born in 1758 in Tiefenbrunn, in Baden. He studied medicine, and practised at Vienna as a physician, where he made himself known to advantage by his Philosophisch-medicinische Untersuchungen (1791). After a series of comparisons of the skulls both of men and animals he was led to assign the particular location of twenty organs. For some time he confined himself to lecturing on the subject, first in Vienna, and afterwards in his travels through Germany. He then accompanied Dr. Spurzheim, in 1807, to Paris, where he published with his friend, in 1810, the Anatomie et Physiologie du Système Nerveux en général, et du Cerveau en particulier; and in 1812 his own Des Dispositions innées de l'Âme et de l'Esprit, ou du Matérialisme. Spurzheim also published, in London, a work upon his own and Gall's discoveries, which met with severe criticism but extended their views, and at least gave an impulse to the accurate anatomical study of the brain. Dr. Gall died in 1828.

Gall, ST. (German, *St. Gallen*), a north-eastern frontier canton in Switzerland, abutting on Lake Constance; partly bounded by the Rhine, and inclosing the canton of Appenzell. Its area is 780 square miles. In the south it is one of the loftiest Alpine districts of Switzerland, and in other quarters is more or less mountainous. It belongs wholly to the basin of the Rhine, in the valley of which the climate is comparatively mild, in the mountainous districts it is very rigorous. Wood and good pasture are found on the mountains; on the lower slopes and valleys, vines and orchard fruits, and corn, maize, hemp, and flax are grown. The manufactures are chiefly cotton and linen goods, particularly fine muslins. The constitution is one of the most democratic in Switzerland. German is the language spoken. Pop. 228,174.—ST. GALL, the capital and the see of a bishop, is situated on the Steinach, 2165 feet above sea level. It contains an old cathedral, now completely modernized, and an old abbey partly converted into public offices, but containing also the bishop's residence and episcopal library with valuable manuscripts. The manufactures consist chiefly of cotton goods, more especially embroidered muslins and prints; and the town is the entrepôt both for its own canton and those of Appenzell and Thurgau. It is of ancient origin, having grown up around the abbey of St. Gall, founded by an Irish monk of that name about the beginning of the 7th century. This abbey for several centuries held one of the highest places in the Benedictine order. Pop. 32,478.

Gallait (gȧl-lā), LOUIS, Belgian historical painter, born 1812, died 1887. He studied at his native town Tournai, Antwerp, and Paris, where he acquired a name by his portraits as well as his genre and historical paintings. Among his earlier pictures of note were: Christ Restoring Sight to a Blind Man; The Strolling Musicians; The Beggars; Montaigne Visiting Tasso in Prison; Abdication of Charles V. Among his subsequent pictures are: Temptation of St. Antony; The Dead Bodies of Counts Egmont and Horn; The Prisoner's Family; The Last Moments of Count Egmont; Alva Signing Death-warrants; and lastly (1882), The Plague at Tournai, purchased for Brussels Museum at the price of 120,000 francs.

Galland (gȧl-äṇ), ANTOINE, a French oriental scholar, born in Picardy in 1646; principally known for his translation of the Arabian Nights' Entertainments (1704–1717), the first into any European language. Among his other writings are a Treatise on Medals and Coins; Tableau de l'Empire Ottoman; De l'Origine du Café; Paroles remarquables, Bons Mots et Maximes des Orientaux; and the Contes et Fables Indiennes de Bidpaï et de Lokman. In 1709 he was appointed professor of Arabic at the Collége Royal at Paris, and died in 1715 while engaged in translating the Koran.

Gallas, a numerous and powerful race, chiefly inhabiting a territory in East Africa, lying to the south of Abyssinia. Their colour varies from a deep black to a brownish yellow; stature tall; bodies spare, wiry, and muscular; nose often straight, or even arched; lips moderate; hair often hanging over the neck in long twisted plaits. They have agreeable countenances, and are brave, but ferocious and cruel, cunning and faith-

less. They leave the plains to their horses, sheep, and cows, while they themselves cultivate the mountains. There are, however, wandering Gallas mainly occupied in hunting and slave-dealing. Their language is spoken throughout a great part of Africa south of the equator. They have no priests, and while believing in a Being named Wake, to whom, on particular occasions, they sacrifice a cow or sheep, they have no system of religion.

Gall-bladder, a small membranous sac, shaped like a pear, which receives the gall or bile from the liver by the cystic duct. It is situated on the inferior surface of the right lobe of the liver.

Galle (gal), a seaport near the south-west extremity of Ceylon, on a low rocky projecting point of land. It is well built, has a good harbour, and fine scenery adjoining. It is a coaling station for steamers, but has been superseded by Colombo as a port of call for mail steamers. Pop. 33,505.

Gal'leass. See *Galley*.

Gal'leon, formerly a kind of vessels of war, used by the Spaniards and Portuguese, with from three to four decks. In more recent times those vessels were called *galleons* in which the Spaniards transported treasure from their American colonies.

Gal'lery, in architecture, a long, narrow room, the length of which is at least three times its width, often built to receive a collection of pictures. Among the most renowned European art-galleries are those of the Louvre at Paris, that of Versailles, the National Gallery in London, the Pitti and Uffizi galleries at Florence, the Dresden Gallery, the Real Museo of the Prado at Madrid, the Hermitage at St. Petersburg, the gallery of Berlin, the gallery of the Museo Borbonico at Naples, those at Venice, Antwerp, Turin, &c. The term gallery is also sometimes applied to what is more properly termed a corridor, likewise to a platform projecting from the walls of a building supported by piers, pillars, brackets, or consoles, and in churches, theatres, and similar buildings, to the upper floors going round the building next the wall.

Galley, a low, flat-built vessel with one deck, and navigated with sails and oars, once commonly used in the Mediterranean. The common galleys varied from 100 to 200 feet in length, those of smaller sizes being known respectively as half-galleys and quarter-galleys. They carried as many as twenty oars on each side, each oar worked by one or more men, and they had commonly two masts with lateen sails. Raised structures in the stern, and even in the prow, were not uncommon. These, however, were more fully developed in the kind of galley known as the *galleass*, which carried three masts, from 200 to 300 rowers, and sometimes twenty guns. France formerly had a number of galleys for service in the Mediterranean, in which convicts were forced to labour. The term galley is also applied to the ships of the ancient Greeks and Romans, especially to their war-ships, which were propelled chiefly by oars.

Galley, in printing. See *Gally*.

Galley-slave, a person condemned to work at the oar on board a galley, being chained to the deck. This mode of punishment was common in France previous to 1748.

Gall-fly, a name for several hymenopterous insects of the family Cynipidæ, which form the morbid products known as galls, each species seeming to be addicted to a particular plant and a particular part of the plant. The tumour or gall is due to the morbid action of an irritating fluid deposited with the egg of the insect. The large galls at the base of oak leaves are produced by the *Cynips quercus baccārum*, a fly of a brown colour, with black antennæ, chestnut-brown legs, and white wings. The small galls on the under surface of oak leaves are due to another species, *C. quercus folii*, those on the stems of oaks to *C. terminālis*. The shrubby oak (*Quercus infectoria*) of Syria is attacked by *C. gallæ tinctoriæ*, which gives rise to the hard gall or gall-nut which is chiefly used in commerce. The hairy gall of the rose, called a *bedeguar*, is also the work of a species of *Cynips*. The larvæ in this, as in the oak gall, do not come out till the following spring. See *Galls*.

Gallia. See *Gaul*.

Gallic Acid ($C_7H_6O_5$), an acid which derives its name from the gall-nut, whence it was first procured by Scheele in 1786. It exists ready formed in the seeds of the mango, has been found besides in many other plants, in acorns, colchicum, divi-divi, hellebore root, sumach, tea, walnuts, &c., and is a product of the decomposition of tannic acid. It crystallizes in brilliant prisms, generally of a pale-yellow colour. It colours the persalts of iron of a deep bluish black. It is of extensive use in the art of dyeing, as it constitutes one of the principal ingredients in all the shades of black, and is employed to fix or improve

several other colours. It is well known as an ingredient in ink. See *Ink*.

Gal'lican Church, a distinctive name applied to the Roman Catholic Church in France. The peculiarity of this church consists (or consisted) not in any diversity of doctrine or practice from those generally held and observed by Roman Catholics in other countries, but in maintaining a greater degree of independence of the Papal see, more especially by denying the validity of many of the decretals issued since the time of Charlemagne, and refusing to allow the pope to interfere with the civil jurisdiction of the state and the sovereign rights of the crown. The freedom asserted in this respect was increasingly recognized by the pragmatic sanctions of 1269 and 1438, and was still more clearly established by the Quatuor Propositiones Cleri Gallicani (Four Propositions of the French Clergy), drawn up in convocation by the French clergy in 1682. These were:—1. The pope in secular matters has no power over princes and kings, and cannot loose their subjects from allegiance to them. 2. He is subject to the decrees of a general council. 3. His authority in France is regulated by fixed canons and the laws and customs of the kingdom and church. 4. In matters of faith his decision is not unalterable (*irreformable*). During the revolution the Gallican Church practically disappeared, and though Napoleon extorted from Pius VII. a concordat for its re-establishment, no agreement was arrived at as to its organization. With the return of the Bourbons the bishops deprived by Napoleon were restored, and a new concordat concluded in 1817; but its unpopularity led the government to exact from ecclesiastics an expression of adherence to the articles of 1682. The July revolution in 1830 gave full freedom to all denominations, and a clause was inserted in the Constitutional Charter expressly declaring that each person professes his religion with equal liberty, and obtains for his worship the same protection. Latterly, and especially since the Vatican Council of 1870, the position of the Gallican Church towards the popes has essentially changed, and the older Gallicanism may now be said to be represented by the Old Catholics of France.

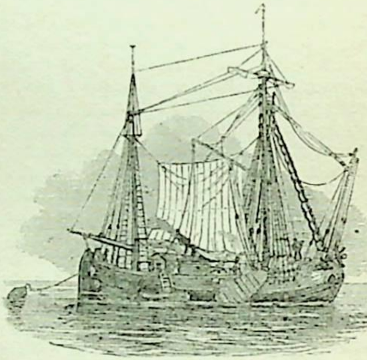
Gallie'nus, P. Licinius, a Roman emperor, associated with his father Valerianus until the capture of the latter by the Persians in 260, when Gallienus continued to reign alone. His empire was limited by the revolt of most of the legions in the provinces, who chose their commanders as Cæsars, and thus gave rise to the period known as the 'Time of the Thirty Tyrants.' Though given up to pleasure, he defeated the Goths in Thrace and Postumus in Gaul, and forced Aureolus, whom the legions of Illyria had proclaimed emperor, to take refuge in Milan. While making preparations to reduce that town he himself was assassinated A.D. 268.

Gallina'ceous Birds, the order of birds now commonly known as *Rasores*.

Gall-insects. See *Gall-fly*.

Gal'linule, a name for aquatic birds belonging to the family Rallidæ or rails, genera *Gallinŭla* and *Porphyrio*. They are good swimmers, though they are not web-footed, but have the toes furnished with a narrow membrane. The common gallinule, moorhen or water-hen (*G. chlorŏpus*), is the only British species. It is black, with a red frontal shield.

Gal'liot, a Dutch or Flemish vessel for cargoes, with very rounded ribs and flattish bottom, with a mizzen-mast placed near the



Dutch Galliot.

stern, carrying a square main-sail and main-top-sail, a forestay to the main-mast (there being no foremast), with forestay-sail and jibs.

Gallip'oli (ancient *Callipolis*), a seaport of Southern Italy, in the province of Lecce, on a rocky peninsula in the Gulf of Taranto, 47 miles south-east of Taranto. It is fortified, and has a cathedral, a productive tunny fishery, and a good harbour, from which large quantities of olive-oil are exported. Pop. 7578.

Gallip'oli (ancient *Callipolis*), a town in European Turkey, on a peninsula of the

same name at the north-east end of the Dárdanelles, 128 miles w.s.w. of Constantinople. It was once fortified, but is now in a generally dilapidated condition, with no edifice of note except the bazaars. It has manufactures of cotton, silk, and morocco leather, and two harbours, one used as a station for the Turkish fleet, and the other for trade, chiefly in corn, wine, and oil. It was the gate by which the Turks entered Europe (1357), and in the Crimean war the allied forces landed here (1854). Pop. about 50,000.

Gallipoli Oil, a coarse olive-oil used in Turkey-red dyeing and for other purposes, and prepared from olives grown in Calabria and Apulia, the latter being considered the best. The oil is conveyed in skins to Gallipoli, where it is clarified and shipped in casks.

Gal'lium, a rare malleable metal, discovered by spectrum analysis in 1875 by De Boisbaudran in the zinc-blende of Pierrefitte in the Pyrenees. It is of a grayish-white colour, has a brilliant lustre, and is fused by the mere warmth of the hand. In its properties it is related to aluminium.

Galliwasp, the *Celestus occiduus*, a species of lizard about 1 foot in length, and remarkably stout and plump. Its general colour is brown. It is a native of the West Indies, and is particularly common in Jamaica, where it is much dreaded, though without reason.

Gall-nuts. See *Galls.*

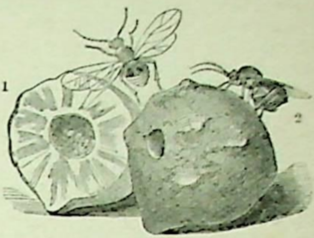
Gallon, a standard measure of capacity, containing 277·27384 cubic inches, being equal to 4 quarts or 8 pints. In England formerly three different gallons were in use, the old corn-gallon of 268·8 cubic inches, the old wine-gallon of 231 cubic inches, and the old beer-gallon of 282 cubic inches. The gallon of 231 cubic inches has been adopted as the standard of the U. States.

Galloon', in commerce, a narrow kind of lace used to edge or border cloths.

Gallotannic Acid. See *Tannin.*

Gal'loway, a district in the south-west of Scotland, now regarded as embracing Wigtownshire and Kirkcudbright. It has given name to a breed of horses and one of cattle.

Galls, gall-nuts or nut-galls, a vegetable excrescence produced by the deposit of the egg of an insect in the bark or leaves of a plant. The galls of commerce are produced by a species of *Cynips* (see *Gall-fly*) in the tender shoots of the *Quercus infectoria*, a species of oak abundant in Asia Minor, Syria, Persia, &c. They are spherical and tubercular, and vary in magnitude from the size of a pea to that of a hazel-nut. White, green, and blue varieties are recognized, the latter kinds being the best. They are inodorous, but are strongly astringent from



Aleppo Gall and the Gall-fly (*Cynips gallæ tinctoriæ*).

1. Gall split to show the cell in which the larva exists. 2. Exterior of the gall, showing the opening by which the perfect insect escapes.

the tannin and gallic acid which they contain, and which are their chief products. Gall-nuts are extensively used in dyeing and in the manufacture of ink, and they are also frequently used in medicine. They are chiefly imported from Aleppo, Tripoli, and Smyrna. The Chinese galls, or *woo-pei-tsze*, differ from the foregoing in that they are really an unusually massive kind of crust or cocoon, such as the aphides form on the surface of a plant; the tissues of the plant are not affected. Since the opening of the Japanese ports these have been imported in considerable quantities to Britain.

Gall-stones. See *Calculus.*

Gally, in printing, a frame into which the compositor empties the lines out of his composing-stick, and in which he ties up the page when completed. See *Printing.*

Galston, a manufacturing town of Scotland, co. Ayr, on the Irvine. Pop. 4296.

Galt, a town of Canada, prov. Ontario, 25 m. w.n.w. Hamilton. Pop. 7535.

Galt, John, Scottish novelist, born at Irvine in Ayrshire in 1779. He went to London in 1804, printed an epic on the Battle of Largs, and tried both commerce and the legal profession; but failing in each, went abroad for some years. On his return in 1812 he published his Voyages and Travels, his Letters from the Levant, a Life of Cardinal Wolsey, and a volume of tragedies. He then became a contributor to the Monthly Magazine and other periodicals, and wrote a tragedy, The Witness, a life of West the artist, and a romance on

the Wandering Jew. His Ayrshire Legatees (1820), with its humorous descriptions of Scottish middle and low life, indicated the true scope of his faculty, and it was followed by his Annals of the Parish (1821), The Provost (1822), Sir Andrew Wylie (1822), and The Entail (1823). These were perhaps his best works, though his writings comprised about fifty novels, twenty dramas, and other works. He went out to Canada as superintendent to the Canada Company in 1826, founded the town of Guelph, returned in 1829, and died in 1839. His son Sir Thomas Tilloch (1817–93) was an eminent Canadian statesman and diplomatist.

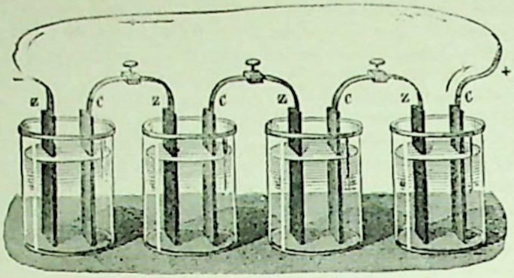


Fig. 1.—Simple Galvanic Battery.

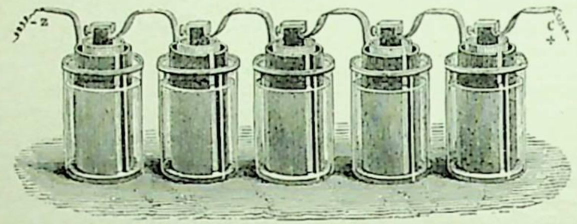


Fig. 2.—Bunsen's Battery.

Galvani, Luigi, Italian physician and physiologist, born at Bologna 1737, died 1798. He practised medicine in Bologna, and was in 1762 appointed professor of anatomy at the university. He gained repute as a comparative anatomist; but his fame rests on his theory of animal electricity, enunciated in the treatise De Viribus Èlectricitatis in Motu Musculari Commentarius, published in 1791. Twenty years before the publication of this treatise he had been making experiments on the relations of animal functions to electricity. In 1797 he was deprived of his chair for refusing to take the oath of allegiance to the Cisalpine Republic, but was restored to it in less than a year. See also the article *Galvanism.*

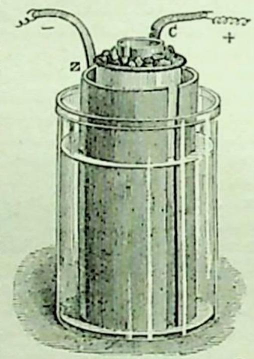


Fig. 3.—Daniell's Cell.

Galvanic Battery, a combination of galvanic cells. In a galvanic cell chemical action takes place between a liquid and a metal—usually zinc—which is partially immersed in it; and there is another metal, or solid conducting substance of some kind, also partially immersed. The zinc and the other solid conductor are called the two *plates* of the cell. The plates must not be allowed to touch each other in the liquid; but a current through an external conductor can be obtained by connecting its ends with the two plates. When this connection is made there is a complete circuit round which the current flows, its course being from the zinc plate through the liquid to the other plate, and from this latter through the external conductor to the zinc plate again. There is a continual circulation of positive electricity in this direction as long as the chemical action continues, or, what is the same thing, there is a continual circulation of negative electricity in the opposite direction. The second or inactive plate is usually either of copper, of platinum, or still more frequently of gas carbon, that is, the carbon which is deposited in the retorts at gas-works. The liquid which acts on the zinc is most frequently dilute sulphuric acid—1 part of acid to 6 or 8 of water. In some of the best kinds of cell there are two liquids—one in contact with the zinc and the other with the inactive plate, with a porous partition of unglazed earthenware between them.

Fig. 1 shows a battery of four cells of the simplest kind, each containing a plate of zinc and a plate of copper immersed (except their upper portions) in dilute acid contained in a glass vessel. It will be observed that the copper (c) of each cell is connected with the zinc (z) of the next. The arrows show the direction of the current. Fig. 2 represents a very common form of battery called Bunsen's. The zinc plate consists of a slit cylinder surrounding the porous vessel in which the carbon plate stands, the whole being contained in a glass jar. The liquid in which the zinc is immersed is dilute sulphuric acid, and the liquid in contact with the carbon is strong nitric acid. Fig. 3 represents a Daniell's cell, which differs from Bunsen's in the contents of the porous cell. The plate within the porous cell is of copper, and the liquid in contact with the copper is a saturated solution of sulphate of copper, crystals of which are seen heaped up round the top. These crystals are supported by a cage of copper wire, and are intended for keeping the solution saturated.

In the simpler forms of galvanic cell, such as that represented in fig. 1, there is a continual evolution of hydrogen at the inactive plate, while an equivalent quantity of oxygen enters into combination with the zinc plate, and goes to form sulphate of zinc. Some of the evolved hydrogen adheres to the copper plate and produces a rapid falling off in the electromotive force of the cell. This action, which is the principal cause of the rapid weakening of the current in batteries composed of such cells, is called *polarization*. The purpose of the two-fluid arrangement illustrated in figs. 2 and 3, is to intercept the hydrogen and prevent it from being deposited on the copper or carbon plate. In Daniell's battery, which was the first of the kind, the hydrogen is taken up by the solution of sulphate of copper, and displaces copper, which is deposited on the copper plate. In Bunsen's it is taken up by the nitric acid, which is thus gradually converted into nitrous acid.

It is usual to amalgamate the zinc plates of a battery by washing them with acid, and then rubbing them with mercury. The reason for this operation is, that when ordinary commercial zinc is used without amalgamation, local currents are formed between different portions of the same plate, owing to inequalities or impurities. This *local action*, as it is called, eats away the plates without contributing to the current in the general circuit. Amalgamation renders the surface uniform and prevents this injurious action.

The strength of the current given by a battery depends partly on the electromotive force of the battery and partly on its resistance. If two batteries are connected into one circuit in such a way that they tend to drive currents round it in opposite directions, the one which prevails is said to have the greater electromotive force. The electromotive force is proportional to the number of cells, and is independent of their size. As regards resistance, the current will be strongest when the resistance is least, that is when the plates are very large and very near together.

Whenever chemical action takes place, heat is produced; but in the ordinary use of a galvanic battery only a portion of this heat is produced in the cells themselves; the rest of it is produced in the external conductor. When we heat a wire by sending the current of a battery through it, the heat generated in the wire is a portion of the heat due to the chemical action in the cells. In cells of high electromotive force the heat due to the chemical action is greater (for the same quantity of zinc dissolved) than in cells of low electromotive force. It is much higher for a Bunsen than for a Daniell cell.

Galvanism, the production of electricity by means of the galvanic battery (which see). The name is derived from Galvani, professor of anatomy at Bologna, who observed that the limbs of a dead frog could be caused to move by the contact of metals. His experiments attracted the attention of Volta, professor of natural philosophy at Pavia, who shortly afterwards invented the galvanic or voltaic battery.

Galvanized Iron, a name loosely given to sheets of iron coated with zinc by a non-galvanic process, the iron being first cleansed by friction and the action of dilute sulphuric acid, and then plunged into a bath composed of melted zinc and other substances, as sal-ammoniac, or mercury and potassium; more properly the name is given to sheets of iron coated first with tin by a galvanic process, and then with zinc by immersion in a bath containing fluid zinc covered with sal-ammoniac mixed with earthy matter. So long as the coating is entire, and so long as it is not exposed to corrosive substances, galvanized iron is very durable.

Galvanometer, an instrument for measuring an electric current by the deflection of a magnetic needle. The current flows through a wire coiled usually into the form of a circle, which is placed vertically in the magnetic meridian and surrounds the needle. When no current is passing the needle points north and south, and the galvanometer should be so placed that the needle when so pointing lies in the plane of the coil. When a current passes through the coil, it exerts a force upon the needle tending to set it at right angles to the plane of the coil—that is, to set it east and west. The action of the earth on the other hand tends to set it north and south, and it will actually take an intermediate position which varies with the strength of the current. This position is read off on a graduated circle (the upper of the two graduated and horizontal circles in fig. 2), usually by means of a long light pointer (shown in the figure) which is attached to the needle at right angles. In some galvanometers, as in that represented in figure 2, the coil can be turned till it overtakes the needle. The lower graduated circle is for the purpose of measuring the amount of this rotation.

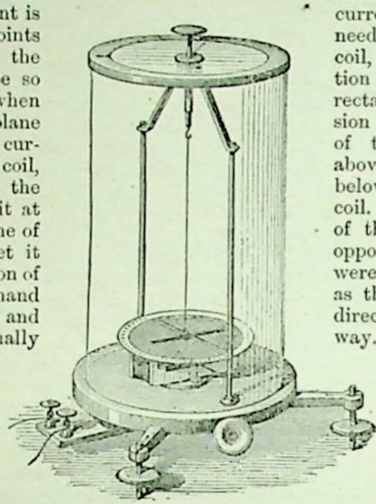


Fig. 1.—Astatic Galvanometer.

For measuring very feeble currents, it is more usual to employ the 'astatic' galvanometer, represented in fig. 1. It has two needles, $a'b'$, $a\,b$ (fig. 3), as nearly equal as possible, fastened to one upright stem, *with their poles pointing opposite ways.* The directive actions of the earth on the two needles are opposite, and hence the resultant directive action of the earth on the two combined is very small. The coil of the galvanometer, on the other hand, is so placed that the current tends to deflect both needles the same way. The coil, which is shown in section in fig. 3, is approximately rectangular, its longest dimension being horizontal. One of the needles $a'b'$ is just above, and the other $a\,b$ is below the upper part of the coil. The current in this part of the coil would urge them opposite ways if their poles were similarly directed, but as their poles are oppositely directed it urges them the same way. The current in the lower part and ends of the coil assists in deflecting the lower needle, and is too distant from the upper needle to have much effect upon it. The coil is thus placed in a position of great advantage as compared with the earth, and the deflection is proportionately large.



Fig. 2.—Sine Galvanometer.

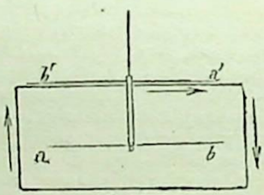


Fig. 3.

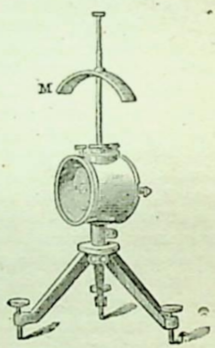


Fig. 4.—Mirror Galvanometer.

Much greater sensitiveness can be obtained by the use of the mirror-galvanometer, fig. 4. The round box in the centre contains a coil of some hundreds of convolutions, with a very small needle fastened to a little glass mirror suspended in its centre by a silk fibre. The mirror, with the needle fastened to its back, is shown at M in fig. 5. Light from a lamp L comes through the hole

s and falls upon the mirror, which, being slightly concave, reflects it to a focus on the scale A A, where a bright image of the flame is accordingly seen. The smallest angular movement of the mirror causes a very

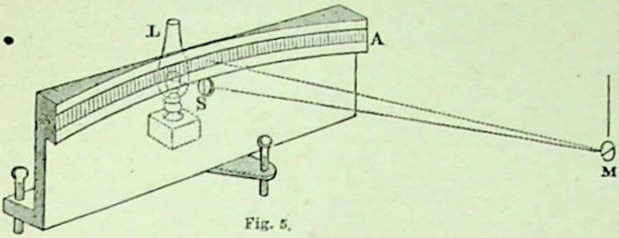


Fig. 5.

visible movement of the bright image on the scale. The curved bar M in fig. 4 is a magnet (called the *controlling magnet*), which can be raised or lowered, and turned round. One use of it is to bring the needle into the plane of the coil when the coil is not standing north and south. It is better, however, to keep the coil north and south, and then the magnet M can be used to annul the earth's magnetism, thus conferring the same advantage which is obtained by the use of two needles in the astatic galvanometer.

For the general principle which governs the deflection of a needle by a current, see *Electromagnetism.*

Galvanoplasty. Same as *Electrometallurgy.*

Gal'veston, a city and seaport of Texas, United States, at the north-east extremity of Galveston Island, at the mouth of Galveston Bay, about 450 miles south by west from New Orleans. It is one of the most flourishing ports in the Gulf of Mexico. Large quantities of cotton are shipped, the export to Great Britain alone being over 300,000 bales annually. The chief buildings are the custom and market houses, the town-hall, a number of churches, including a Gothic Episcopal Church and Roman Catholic cathedral, and the Roman Catholic University of St. Mary. Immense loss of life and damage to property was caused by a hurricane in 1900. Pop. 29,084.

Gal'way, a seaport of Western Ireland, prov. of Connaught, capital of county of same name, at the mouth of the Corrib, in Galway Bay, 117 miles west of Dublin. It consists in its older parts of narrow, irregular streets with antique houses, crowded with a pauper population; in the more modern parts it is spacious and well-built. Besides numerous churches and chapels it has three monasteries and five nunneries. The town-house and county-hall and the Queen's College are amongst its best buildings. The manufactures are insignificant, and the trade, though once important, is no longer worthy of its excellent harbour. The chief exports are agricultural produce and marble. There are mills for sawing and polishing marble, a brewery, distillery, &c. Galway returns one member to parliament. Pop. 16,942.—The county, which is washed by the Atlantic, has an area of 1,502,362 acres, of which one-eighth is under crops. In the north-west, or district of Connemara, it is rugged and mountainous; in the east, level but extensively covered with bog; and in the south, fertile and tolerably well cultivated, producing wheat, barley, and oats. Lough Corrib, which lies wholly within it, dividing the county into the E. and W. districts, is the third largest lake in Ireland. The minerals include lead, limestone, marble, and beautiful serpentine. The fisheries are valuable, but much neglected. The principal manufactures are coarse woollens and linens. The county returns four members to parliament. Pop. 214,256.

Galway Bay, a large bay on the west coast of Ireland, between county Galway on the north and county Clare on the south, about 30 miles in length and from 20 to 7 miles in breadth. Across its entrance lie the Aran Islands, and there are numerous small islands in the bay itself.

Gama, DOM VASCO DA, the first navigator who made the voyage to the East Indies by the Cape of Good Hope, was born in 1450 at Sines, Portugal, of a noble family. The voyage had been projected under John II., and his successor, Emmanuel the Fortunate, having fitted out four vessels, intrusted Gama with the chief command. He sailed from Lisbon on July 8th, 1497, and doubling the Cape, visited Mozambique, Mombaza, Melinda, and Calicut, returning to Lisbon in 1499. For this exploit he was named Admiral of the Indies and received the title of Dom, with an annual pension and extensive privileges in Indian commerce. In the year 1502 he was placed at the head of a

powerful fleet, with which he provided for the security of future voyagers by founding establishments at Mozambique and Sofala. He also inflicted signal reprisals on the town of Calicut, where the Portuguese residents had been massacred, and established the first Portuguese factory in the Indies. He re-entered Lisbon in 1503, and passed the next twenty years in obscurity. In 1524 he was appointed Viceroy of India by King John III., but his administration lasted only three months, his death taking place at Goa in the December of that year.

Gama-grass. See *Buffalo-grass.*

Gama'liel, the name of two persons mentioned in Bible history, of whom the first, Gamaliel, the son of Pedahzur (Numbers i. 10; ii. 20; vii. 54, 59; x. 23), was prince or head of the tribe of Manasseh. The other and better known Gamaliel is mentioned twice in the Acts of the Apostles, as a learned doctor of the law, of the sect of the Pharisees. From Acts xxii. 3 we learn that he was the preceptor of St. Paul; the other reference (Acts v. 34) records his famous advice to the Sanhedrim as to their treatment of the apostles. According to tradition Gamaliel became a Christian, and was baptized by St. Peter and St. Paul.

Gam'beson. See *Acton.*

Gambet'ta, LÉON MICHEL, a French orator and statesman, born in 1838 at Cahors, of a family of Genoese extraction. He was educated for the church, but finally decided in favour of the law, and repairing to Paris became a member of the metropolitan bar in 1859. In November 1868 he gained the leadership of the republican party by his defence of Delescluze, a noted republican. In 1869, having been elected by both Paris and Marseilles, he chose to represent the southern city; and in the Chamber of Deputies showed himself an irreconcilable opponent of the empire and its measures, especially of the policy which led to the war with Prussia. On the downfall of the empire, after the surrender of Sedan in 1870, a government for the national defence was formed, in which Gambetta was nominated minister of the interior. The Germans having encircled Paris, he left that city in a balloon, and set up his headquarters at Tours, from which, with all the powers of a dictator, he for a short time organized a fierce but vain resistance against the invaders. After the close of the war he held office in several short-lived ministries, and in November, 1881, accepted the premiership. The sweeping changes proposed by him and his colleagues speedily brought a majority against him, and after a six weeks' tenure of office he had to resign. The accidental discharge of a pistol caused his death at Paris in December, 1882.

Gambia, a British colony in West Africa, at the mouth of the river Gambia; area, 69 sq. miles. The climate is very unhealthy in the rainy season, and there is little fertile land in the colony, but a considerable trade is done in ground-nuts, hides, bees'-wax, rice, cotton, maize, ivory, ginger, gum-arabic, palm-oil, &c. Pop. 14,150.

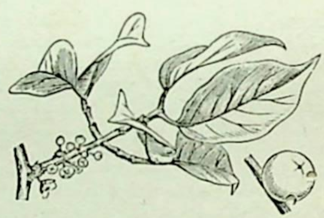
Gambia, a river of West Africa, rising in a mountainous district in Futa Jallon and flowing N.W. and W. to the Atlantic; length about 1400 miles. It is navigable for 600 miles during seven months of the year for vessels of 150 tons, but from June to November the river becomes a torrent, rising from 20 to 50 feet and leaving a rich alluvial deposit on its shores.

Gambier Islands, a group of small coral islands in the South Pacific, about lat. 23° 8′ S. and lon. 134° 55′ W.; belonging to France. The vegetation is luxuriant and there are numerous birds but no indigenous quadrupeds. A French mission station was formed on the largest island, Mangareva, in 1834. Pop. about 2300.

Gambir, an astringent, earthy-looking substance chiefly employed in tanning and dyeing, and obtained from the East Indian trees *Uncaria (Nauclea) gambir* and *U. acida*, order Cinchonaceæ. It is mainly imported from Singapore. Also called *Terra Japonica* and *Pale Catechu.*

Gambling. See *Gaming.*

Gamboge (from *Camboja* or *Cambodia*), a concrete, vegetable, inspissated juice or sap, or gum-resin, yielded by several species of



Gamboge Plant (*Garcinia Hanburii*).

trees. The gamboge of European commerce appears to be mainly derived from *Hebradendron gambogoides* (or *Garcinia Morella*), a diœcious tree with handsome laurel-like

foliage and small yellow flowers, found in Cambodia, Siam, and in the southern parts of Cochin-China. It is yellow, and contained chiefly in the middle layer of the bark of the tree; it is obtained by incision, and issues in the form of a yellowish fluid, which, after passing through a viscid state, hardens into the gamboge of commerce. It consists of a mixture of resin with 15 to 20 per cent of gum. Gamboge is used in painting, staining, and lacquering. As a drug it has drastic purgative properties, but is seldom administered alone. In doses of a drachm or even less it produces death. Other species of *Garcinia* yield a similar drug, which is collected for local use. The so-called American gamboge is the juice of *Visima guianensis*.

Game Laws, laws relating to the killing of certain wild animals pursued for sport, and called game. Formerly in Britain certain qualifications of rank or property were needed to constitute the right to kill game; but by the Game Act of Will. IV. the necessity for any qualification except the possession of a game certificate was abolished, and the right given to any one to kill game on his own land, or on that of another with his permission. The animals designated as game by this act are hares, pheasants, partridges, grouse, heath-game, or moor-game, black-game, and bustards. These animals, however, with the exception of hares, are not allowed to be killed during a certain season of the year called the close season, which is for partridges from 1st February to 1st September, for pheasants from 1st February to 1st October, for black-game from 10th December to 20th August. Also any person killing game on Sunday or Christmas-day is liable to a penalty of £5. A game certificate is also necessary to enable a person to kill deer, woodcocks, snipes, quails, land-rails, and rabbits. Whoever trespasses by day in pursuit of game, or any of the above-mentioned animals, is liable to the fine of £2, and when five or more go together each is liable to the penalty of £5. Night poaching is a graver offence; any person found guilty of trespassing in pursuit of game between the first hour after sunset and the last before sunrise, is for the first offence liable to imprisonment with hard labour for three months and to find security for a year, a third offence involving liability to penal servitude. By the act of 1860 the duties on certificates for killing or dealing in game are declared to be excise duties, and are regulated as follows:—For a license in Great Britain, or certificate in Ireland, to each person using a dog, gun, net, or other engine for taking or killing any game whatever, if taken after 5th April and before 1st November, to expire on 5th April in the following year, £3; if to expire on 31st October of the same year, £2; from 1st November to 5th April, £2; license to servant, if person authorized to kill game, £2; license to deal in game in England, Scotland, or Ireland, £2. A duty of 10*s*. is imposed for a license to make use of a gun. By an act of 1880 every occupier of land has a right, as inseparable from and incident to the occupation of the land, to kill and take ground-game (hares and rabbits) thereon, concurrently with any other duly authorized person, all agreements in contravention of this right being declared void. Game laws of greater or less strictness are in force in many other countries. In Canada and the U. States the chief restrictions are in regard to killing wild animals during the breeding season.

Games, a name of certain sports or amusements carried on under regular rules and methods, as with cards or dice, billiards, tennis, &c. Among the ancients there were public games or sports, exhibited on solemn occasions, in which various kinds of contests were introduced. The Grecian games were national festivals attended by spectators and competitors from all parts of Greece, the chief being the Olympic, Pythian, Nemean, and Isthmian. They consisted of chariot races, running, wrestling, and boxing matches, &c., and to be victorious in one of these contests was esteemed one of the highest honours of a Greek citizen. The Roman games (*ludi*) were held chiefly at the festivals of the gods. They might, however, be exhibited by private persons to please the people, as the combats of gladiators, theatrical representations, combats of wild beasts in the amphitheatre, &c. See also such articles as *Billiards*, *Chess*, *Cricket*, *Football*, &c.

Gaming, or GAMBLING, the practice of indulging in games involving some element of chance or hazard with a view to pecuniary gain. In many countries such games, and the collateral practices of betting on events, taking shares in lotteries, &c., are legally prohibited or restricted as frequently associated with fraud and as themselves demoralizing. At other times governments, tempted by the prospect of gain, have openly encouraged gambling by licensing gaming-

houses, or instituting lotteries under their own authority. (See *Lottery*.) In France public gaming-tables were suppressed from 1st January, 1838, but lotteries are still sometimes carried on. Previous to the formation of the German Empire gambling was encouraged in both of the ways referred to in several of the principalities of Germany. Baden-Baden, in the Grand-duchy of Baden, and Homburg, in Hesse-Homburg, were the two most famous resorts in Europe of the frequenters of gaming-tables. After the formation of the empire gaming was suppressed in these places (31st December, 1872), and since that time the Italian principality of Monaco has become the last public resort of this species of gambling.

In Great Britain gaming has been the subject of numerous enactments. Henry VIII. made proclamation against certain games, including dice, cards, and bowls, and prohibited the keeping of any common house for unlawful games under penalties of 40*s.* per day for keeping the house, and 6*s.* 8*d.* per time for playing in it. By an act of Charles II. (1663) any person fraudulently winning money by gaming is to forfeit treble the amount, and any person losing more than £100 at cards, &c., on credit at one sitting is not bound to pay, and the winner forfeits treble the amount. Under Anne all notes, bills, bonds, &c., given for money won by gaming were decreed void, and any person paying a loss of more than £10 might recover it within three months as a common debt; or if the loser did not sue, any other person might do so. In the reign of William IV. such notes were declared void between the parties, but not in the hands of purchasers or endorsers. Gamblers having no ostensible means of living might be committed to prison. By acts of George II. keepers of public-houses were punishable for permitting gaming, and the games of faro, basset, hazard, roulette, and all other games with dice, except backgammon, are prohibited under penalties of £200 for the keeper of the gaming-house, and £50 a time for the players. The act 8 and 9 Vict. cap. cix., while repealing some of the previous acts, inflicts the penalty of £100 (afterwards increased to a maximum penalty of £500) in addition to the penalties of the act of Henry VIII. on any person conducting a common gaming-house, with the alternative of six months' imprisonment. Penalties are also inflicted for keeping billiard or bagatelle tables without a license. All contracts, by way of gaming or wagering, are made void, and any person fraudulently winning money or valuables by gaming shall be deemed guilty of obtaining it by false pretences. No suit-at-law can be brought to recover a deposit from a stakeholder; but this does not apply to any prize at any lawful sport. Later acts provide that betting-houses shall be considered gaming-houses. (See *Betting*.) An act having special reference to the metropolis imposes penalties of £100 for excluding the police from a gaming-house, and £50 on any person found within who shall give a false name or address.

Gam'ut, or GAMMUT, in music, the entire series of musical tones in the natural order of ascent or descent. With the musicians of the 11th century A represented the lowest note in their instruments, and a lower note having been introduced, the Greek gamma (Γ) was taken to represent it. From its prominent place as first note of the scale its name was taken to represent the whole.

Gandak', GUNDUCK, a river of Northern Hindustan, rising in the Himalayas and entering the Ganges; length, 400 miles.

Gandamak', a place in N.E. Afghanistan, where a treaty with Britain was signed in 1879. See *Afghanistan*.

Gandia, a town and port of Spain, in the province and 34 miles south by east of Valencia, on the Alcoy. It is walled and well built, with a handsome Gothic church and a fine palace of the dukes of Gandia. Pop. 7604.


Ganesa.

Gando, a kingdom of the Western Soudan, intersected by the Niger, and inhabited chiefly by Fellatahs, with a capital of same name. It is most fertile, and has a population of perhaps 5,000,000. Mohammedanism is the prevalent religion. The ruler is a sultan subordinate to that of Sokoto.

Ganesa (ga-nā'sa), an Indian god, the son of Siva and Párvati, represented by a figure

half man half elephant, having an elephant's head. He is the god of prudence and good luck, and is invoked at the beginning of all entérprises. There are not many temples dedicated to him, and he has no public festivals, but his image stands in almost every house.

Ganga, a name of the sand-grouse (*Pterŏcles arenarius*).

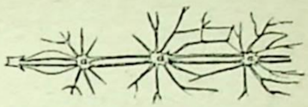
Ganga, in Hindu mythology, the personified goddess of the river Ganges.

Ganges (gan'jez), a river of Hindustan, one of the greatest rivers of Asia, rising in the Himalaya Mountains, in Garhwál state, and formed by the junction of two head streams, the Bhagirathi and the Alaknanda, which unite at Deoprag, 10 miles below Srinagar, 1500 feet above sea level. The Bhagirathi, as being a sacred stream, is usually considered the source of the Ganges, rising at the height of 13,800 feet, but the Alaknanda flows further and brings a larger volume of water to the junction. At Hardwar, about 30 miles below Deoprag, the river fairly enters the great valley of Hindustan, and flows in a south-east direction till it discharges itself by numerous mouths into the Bay of Bengal, after a course of about 1700 miles. During its course it is joined by eleven large rivers, the chief being the Jumna, Son, Ramganga, Gumti, Gogra, Gandak, and Kusi. In the rainy season the flat country of Bengal is overflowed to the extent of 100 miles in breadth, the water beginning to recede after the middle of August. The Ganges delta has the Hugli on the west, the Meghna on the east, and commences about 200 miles, or 300 by the course of the river, from the sea. Along the sea it forms an uninhabited swampy waste, called Sunderbunds, or Sundarbans, and the whole coast of the delta is a mass of shifting mud banks. The westernmost branch, the Hugli, is the only branch commonly navigated by ships. The Meghna, or main branch, on the east is joined by a branch of the Brahmaputra. Some of the principal cities on the Ganges and its branches, ascending the stream, are Calcutta, Murshedabad, Bahar, Patna, Benares, Allahabad, Cawnpore, and Faruckabad. The Ganges is navigable for boats of a large size nearly 1500 miles from its mouths, and it forms a great channel for traffic. It is an imperative duty of the Hindus to bathe in the Ganges, or at least to wash themselves with its waters, and to distribute alms, on certain days. The Hindus believe that whoever dies on its banks, and drinks of its waters before death, is exempted from the necessity of returning into this world and commencing a new life. The sick are therefore carried to the bank of the Ganges, and its water is a considerable article of commerce in the remoter parts of India.

Ganges Canal, UPPER, a lateral canal in Northern India (N. W. Provinces), constructed for purposes of irrigation and supplementary navigation, extending on the right of the Ganges from Hardwar to Cawnpore. The trunk of the canal measures 445 miles, and the total cost of the works has been about £2,800,000.—The LOWER GANGES CANAL is a sort of continuation of the Upper, intended for irrigation purposes.

Gangi (gán'jē), a town of Italy, prov. Palermo, overlooked by an old castle. Pop. 11,935.

Gang'lion, in anat. an enlargement occurring somewhere in the course of a nerve, and containing nerve cells in addition to nerve filaments. There are two systems of nerves which have ganglia upon them.



Ganglion.

Part of the nervous system of the larva of a beetle (*Calosŏma sycophanta*). *aa*, Ganglia.

First, those of common sensation, whose ganglia are near to the origin of the nerve in the spinal cord. Secondly, the great sympathetic nerve, which has ganglia on various parts of it. In the invertebrates ganglia are centres of nervous force, and are distributed through the body in pairs, one for each ring of the body, connected by fibres as in the figure. The cerebral ganglia of vertebrates are the brain itself, the masses of gray matter at the base of the brain, as the optic thalamus, &c.

Gangpur', a native state of Bengal, in Chota Nagpur, consisting mainly of hills, forest, and jungle; area, 2484 sq. miles; pop. 107,965.

Gangrene (gang'grēn), the death of some part of a living body, wherein the tissues begin to be in a state of mortification, there being also complete insensibility. A gangrened part must be removed either by amputation or by natural process, but if a vital part is so affected death will ensue.

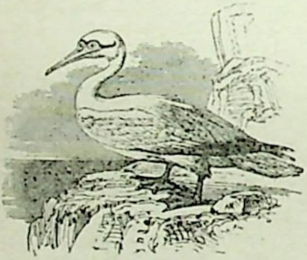
Gangue (gang), a mineral substance surrounding a metallic ore in a vein.

Gangway, a narrow platform or bridge of planks along the upper part of a ship's side for communication fore and aft; also a sort of platform by which persons enter and leave a vessel.—In the House of Commons the gangway is a passage across the house, which separates the ministry and opposition with their respective adherents, who sit on seats running along the sides of the house, from the neutral or independent members, who occupy seats running across. Hence, the phrase *to sit below the gangway*, as applied to a member, implies that he holds himself as bound to neither party.

Ganja. Same as *Hashish.*

Ganjam, a decayed town of India, in the Madras Presidency, formerly capital in the district of same name, near the coast of the Bay of Bengal. It was at one time a flourishing place; but the town has declined since the epidemic of 1815, when Berhampur became the headquarters. The principal arm of the Ganjam River, which enters the sea to the south of the town, is about one-third of a mile broad.—The district, one of the five Circars, is one of the most productive under the Madras Presidency, yielding rice, cotton, sugar, rum, and pulse, &c. Area, 8313 square miles; pop. 1,896,803.

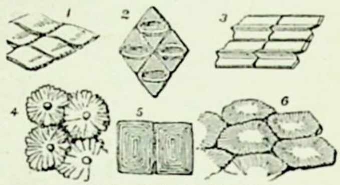
Gannet, the solan goose, a bird of the genus *Sula* (*S. Bassāna*), family Pelecanidæ. It is about 3 feet in length, and 6 in breadth of wings from tip to tip; the whole plumage, a dirty white, inclining to gray; the eyes, a pale yellow, surrounded with a naked skin of a fine blue colour; the bill straight, 6 inches long, and furnished beneath with a kind of



Gannet or Solan Goose (*Sula Bassana*).

pouch. The gannets are birds of passage, arriving in Great Britain about March and departing in August or September, their movements being partially determined by those of the herring, on which they feed. They migrate to the southward in the winter, and appear on the coast of Portugal. In the breeding season they retire to high rocks on unfrequented islands—the Hebrides, Orkneys, St. Kilda, Ailsa Craig, and the Bass Rock. The nests are generally formed of sea-weed. The female lays only one egg, though, if it be removed, she will deposit another. The young, which are much darker than the old birds, remain in the nest until nearly their full size, becoming extremely fat. In St. Kilda they form part of the food of the inhabitants, being taken by men lowered from the top of the cliffs.

Gan'oids (*Ganoidei*), the second order of fishes according to Agassiz. The families



Scales of Ganoid Fishes.

1, Lepidosteus. 2, Cheiracanthus. 3, Palæoniscus. 4, Cephalaspis. 5, Dipterus. 6, Acipenser.

of this order are chiefly characterized by angular, rhomboidal, polygonal, or circular scales composed of horny or bony plates covered with a thick plate of glossy enamel-like substance. The ganoids were most numerous in Palæozoic and early Mesozoic times, but are now represented by seven genera:—*Lepidosteus*, the bony pikes or gar-pikes of the N. American fresh-water lakes; *Polyptĕrus*, represented by a single species occurring in rivers of tropical Africa; *Calamoïchthys*, a similar genus found in Old Calabar; *Amia*, the fresh-water mud-fish of N. America; *Acipenser*, represented by the sturgeon; *Scaphirhynchus*, best known by the so-called shovel-nosed sturgeon of the Mississippi basin; and the genus *Polyodon* or *Spatularia*, the paddle-fishes of the Mississippi and great rivers of China. Of the extinct ganoids the most remarkable are the placoderms of the Silurian and Devonian period, comprising the earliest known remains of fishes. The Palæozoic ganoids have all heterocercal tails, forms with diphycercal tails not appearing till the secondary period.

Gantung Pass, a wild pass in the Western Himalayas between Bussahir in the Punjab and Tibet. It is covered with perpetual snow, and is 18,295 feet in height.

Gan'ymede (-mēd), in Grecian mythology, great-grandson of Dardanus, the founder of Troy, and son of Tros and of Callirrhoë, daughter of Scamander. Zeus sent his eagle to carry him off from Mount Ida to Olympus, where he held the office of cup-bearer to the immortals in succession to Hebe.

Gaol, or JAIL, a prison or place of legal confinement. See *Prison*.

Gaol delivery, in law, a commission to the judges on assize to try and deliver every prisoner in gaol on their arrival at the assize town.

Gap, a town of South-eastern France, department of Hautes-Alpes. It is the seat of a bishop, and has a trade in wool, fruit, corn, and cattle. Pop. 7285.

Gaper-shell, a lamellibranchiate mollusc, the *Mya arenaria*, common on the British coasts. It has an oblong shell and burrows in sand and mud, where it is sought after for bait.

Gapes, a disease of fowls and other Rasorial birds, arising from the presence in the windpipe of small parasitic worms (*Fasciŏla tracheālis*) which cause the bird to continually open its beak. They may be dislodged with an oiled feather, or by mixing a little epsom salts with the food.

Gar'ancin, GARANCINE, the product obtained by treating pulverized madder, previously exhausted with water, with concentrated sulphuric acid at 100° Cent. (212° Fahr.), and again washing with water. The residue thus obtained is found to yield better results in dyeing than madder itself.

Garay (gá'rī), JANOS, Hungarian poet, born in 1812; studied at Pesth, where he held a minor post in the public library. His heroic poem, Csatár (1834), was succeeded by a number of dramas, mostly historical, the chief being Arbocz (1837), Országy Ilona (1837), and Bátory Erzsébet (1840). His cycle of historic ballads, showing Uhland's influence, was published in 1847, under the title Arpádok, and his lyric poems, Balatoni Kagylok (Shells from Lake Balaton), in 1843. His last work was a historical epic, Szent László (St. Ladislaus), published 1850. He died blind in 1853.

Garbler, formerly an officer of the city of London, vested with power to enter any shop, warehouse, &c., to examine drugs and spices, and garble (*i.e.* sift out the coarse parts, dirt, &c.) and make clean the same, or see that it were done.

Garcilaso de la Vega (gár-thē-lä'sō; properly *Garcias Laso de la Vega*), called the *prince of Spanish poets*, born at Toledo in 1500 or 1503. He went in his youth to the Spanish court, and in 1529 distinguished himself in the Spanish corps serving against the Turks in Austria. An intrigue with a lady of the court led to his imprisonment on an island in the Danube, where several of his poems were composed. In 1529 he was engaged in the expedition against Soliman, and in 1535 in that against Tunis. He was made commander of thirty companies of infantry in 1536, and accompanied the imperial army against Marseilles, but was mortally wounded in attempting to scale a tower near Fréjus. He died at Nice in that year, and was buried at Toledo. His name is associated with that of his contemporary Boscan in the impetus given to Spanish literature by the imitation of the Italian poetic style as exemplified in Petrarch, Ariosto, and Sannazaro. His works, which consist of eclogues, epistles, odes, songs, sonnets, &c., are graceful and musical.

Garcilaso de la Vega, or GARCIAS LASO DE LA VEGA, historian of Peru, surnamed the Inca, son of Garcilaso de la Vega, one of the conquerors of Peru, and a princess of the race of the Incas; born at Cuzco, Peru, in 1530 or 1540. Having fallen under the groundless suspicion of the Spanish government he was sent home in 1560, and died in 1616 or 1620. His great work on the history of Peru is in two parts: the first entitled Los Comentarios Reales que tratan del Origen de los Incas, &c. (Lisbon, 1609); the second, the Historia general del Peru (Cordova, 1616). He wrote also Historia de la Florida (Lisbon, 1609).

Garcinia, the genus of plants to which the mangosteen and gamboge belong, natural order Guttiferæ.

Gard (gär), a department of Southern France, abutting on the Gulf of Lyons; area, 2256 sq. miles. The north and west are occupied by the Cevennes and their branches, sloping gradually into a fertile plain, the coast-line of which is so low as to form extensive swamps and salines. The drainage belongs partly to the Garonne, but chiefly to the Rhone, which forms the east boundary. Within the department the chief river is the Gard. The rich lower districts produce a large quantity of wine, and are noted for silk-culture. Large quantities of salt are made; and lead, coal, iron, &c., are worked. There are silk, woollen, and cotton manufactures. Nîmes is the capital. Pop. 417,099.

Gard, Pont du, a fine Roman aqueduct, in Gard, 10 miles from Nîmes, joining two mountains and passing over the Gardon. It has three tiers of arches, and is 160 ft. high. See *Aqueduct*.

Garda, or Bena'co, Lake (Ital. *Lago di Garda;* the *Benăcus Lacus* of the Romans), the largest lake in Italy, belonging to the Alpine region, 33 miles long north to south, 3 to 11 miles broad, greatest depth 902 ft., 213 ft. above sea-level. The Sarca, almost its only affluent, enters at its north end, and it is drained by the Mincio, which issues from its south-east end, near Peschiera. It is well stocked with fish. Steamboats ply on it, and its shores are covered with villas.

Gardaya (gȧr-dä'yȧ), or Ghardaya, a town of Algeria, in the Sahara, surrounded by a wall flanked with towers and entered by ten gates. Pop. 28,782. See *Beni-Mzâb*.

Garde Écossaise (gȧrd ā-kos-āz), the Scotch guard in the service of the kings of France, first instituted on a regular footing by Charles VII., who in 1453 selected a hundred Scotch archers to form a special body-guard in recognition of the service of the Scotch soldiery in the Hundred Years' war. There was also another company of a hundred Scots placed at the head of a regular army of fifteen companies of 100 lances each, which was organized. This body was commanded by Scotchmen of the highest rank. James VI., and his sons Henry and Charles, and James II. when Duke of York, held in succession the rank of captain in it.

Gardelegen (gȧr'dė-lā-gėn), a town of Prussia, gov. of Magdeburg. Pop. 7258.

Garde Nationale (nȧ-syo-nȧl), a guard of armed citizens instituted at Paris, July 13, 1789, for the purpose of preserving order and protecting liberty. At first it numbered 48,000 men, but was increased to 300,000 when it was organized throughout the whole country. Acting as a royalist and reactionary force it was crushed by Napoleon in 1795. It was reorganized by the Directory and by Napoleon, and again under the Bourbons, to whom, however, it was a source of such disquietude that it was dissolved by a royal ordinance in 1827. Under Louis Philippe it was resuscitated in its old form, and contributed to his overthrow. In 1851 the national guard was again reorganized, but in 1855 it was dissolved. In 1870 the national guard of Paris was again formed for the defence of the city against the Prussians. The resistance of a section of the guard to the decree of disarmament issued under M. Thiers led to the communal war, at the close of which the guard was declared dissolved by the National Assembly (1871).

Garde Nationale Mobile, a body constituted by Napoleon III. in 1868, on the suggestion of Marshal Niel, to form bases of regiments to supplement the regular army. It was called into action in 1870–71, but was too ill organized to be efficient.

Garde'nia, a genus of trees and shrubs, nat. order Cinchonaceæ, natives of tropical Asia and Africa, bearing beautiful white or yellowish flowers of great fragrance. *G. florida* and *G. radicans* are well known in Britain as Cape jasmine, though natives of Japan.

Gardening. See *Horticulture*.

Garden-spider, also called Diadem or Cross-spider, the *Epeira diadēma*, a common British spider the dorsal surface of which is marked with a triple yellow cross. It forms a beautiful geometric web.

Garden-warbler (*Sylvia* or *Curruca hortensis*), a migratory song-bird visiting Britain from the end of April to September, and ranking next to the blackcap as a songster. It is rather less than 6 inches long, the head, and upper surface greenish brown, the under surface brownish white.

Gardiner, Samuel Rawson, D. C. L., LL.D., English historian, born in 1829, educated at Winchester and Christ Church, Oxford. He was for some years professor of modern history at King's College, London, but resigned in 1885. He has specially devoted himself to the period of English history beginning with the accession of James I., and has given a full and impartial account of the events of the time, based on the original documents. The first section comes down to the outbreak of the civil war (1603–42), the second deals with the civil war (1642–49), the third with the Commonwealth and Protectorate. He has also written a Student's History of England, &c.

Gardiner, Stephen, an English prelate, believed to have been a natural son of Lionel, bishop of Salisbury, and brother of Elizabeth Woodville, queen of Edward IV. He was born in 1483 at Bury St. Edmunds, and in 1520 took the degrees of D.D. and LL.D. at Cambridge, where he became Master of Trinity Hall. He passed at this time by the name of Dr. Stephens. Having become secretary to Wolsey and a favourite with the king, he was despatched to Rome

in 1528 to forward Henry VIII.'s divorce, and on his return was appointed secretary of state, and in succession archdeacon of Norwich and Leicester, and Bishop of Winchester. He also went on various embassies to France and Germany. He supported the king in renouncing the authority of the pope, but opposed the doctrines of the Reformation, and took an active part in the passing of the six articles and in the prosecution of Protestants. He was successful in contriving the fall of his opponent Cromwell, but failed to injure Catherine Parr, and fell into disfavour. During the reign of Edward he was imprisoned in the Fleet, deprived of his bishopric, and afterwards imprisoned in the Tower from 1548–53, but Mary restored him to his bishopric, and appointed him lord chancellor. He officiated at her coronation and marriage, and became one of her chief advisers. He took an active part in the persecutions at the beginning of the reign, but was outdone in ferocity by Bonnar. He died in 1555. He left several works: De Vera Obedientia (1534), a defence of the king's supremacy; A Necessary Doctrine of a Christian Man (1543); Sacrament of the Aulter (1551); and some tracts.



Bishop Gardiner.

Gardner-gun. See *Machine-gun.*

Garfield, James Abram, an American general and statesman, the twentieth President of the United States, born in Ohio, where he worked on a farm till his fourteenth year. He acquired a good education, however, studied law, and in 1859 was elected to the Ohio state senate. In 1861 he entered the army, was appointed colonel, became chief of staff to Rosecranz, and major-general of volunteers. He resigned his command on his election to congress in 1863. He sat in nine congresses for the same constituency, serving on important committees, and winning ground no less by strong intelligence than uncompromising honesty. In 1880 he was elected to the senate, and in the same year became President of the United States. Many reforms seemed about to be inaugurated, when he was shot by a disappointed office-seeker named Guiteau in the railway-station at Washington. He lingered eighty days, dying at Long Branch Sept. 19, 1881.

Gar-fish, Sea-pike, or Gar-pike (*Belŏne vulgăris*), a fish, known also as the *sea-needle*, making its appearance on the English coasts in summer, a short time before the mackerel. It is long and slender, sometimes 2 or 3 feet in length; the head projects forward into a very long, sharp snout; the sides and belly are of a bright silvery colour, and the back green, marked with a dark purple line. The name Gar-fish or Gar-pike is also given to other species of *Belŏne*, and to a ganoid fish of the genus *Lepidosteus*, found in the fresh waters of America. See *Bony-pike.*



Common Garfish (*Belone vulgaris*).

Gar'ganey (*Anas querquedŭla*), a species of duck, called also 'summer teal,' from visiting Britain in summer and being closely akin to the teal. It is widely spread through the eastern hemisphere.

Garga'no (Latin, *Gargānus*), a group of pine-clad mountains in South Italy, province of Foggia, forming the spur of the boot in the Italian peninsula projecting into the Adriatic. The loftiest summit is Calvo, 5450 feet.

Gargan'tua, the hero of Rabelais's satire, so named from his father exclaiming '*Que grand tu as!*' 'How large (a gullet) thou hast!' on hearing him cry out, immediately on his birth, 'Drink, drink!' so lustily as to be heard over several districts. It required 900 ells of linen for the body of his shirt, and 200 more for the gussets, 1100 cow-hides for the soles of his shoes, and he picked his teeth with an elephant's tusk.

Gar'gara (Turkish, *Kasdagh*), the highest mountain of the ridge of Ida, in Asia Minor, near the Gulf of Adramyti, on the north.

Gargle, a liquid application to the throat. In using a gargle the head should be thrown well back so as to keep the liquid in contact with the throat, and by expelling the air from the lungs through the liquid the passage may be thoroughly washed. Care should be taken not to swallow the gargle.

Gar'goyle, in Gothic architecture, a projecting spout, for throwing the water from



Gargoyle, Stony-Stratford.

the gutter of a building, usually of some grotesque form, such as the head or figure of an animal or monster.

Garhmukhtesar. See *Gurmukteswar*.

Garhwál (gar-hwäl'), or GURHWAL, a district in the North-west Provinces, India, bounded on the north by Tibet, east by Kumáun, south by Bijnaur district, and west by the Garhwal state; area, 5500 sq. miles; pop. 407,818. There are good roads, and a considerable trade with Tibet.

Garhwál, or TEHRI, a native Indian state under British protection, west of the district of the same name (see above); area, 4164 sq. miles; pop. 241,242. Chief town, Tehri; chief river, the Alaknanda and other headwaters of the Ganges. A large part is covered with forests, which include valuable *deodar* tracts, leased to the British government in 1864.

Garibal'di, GIUSEPPE, Italian patriot and hero, was born at Nice, 1807, his father being a poor fisherman. He got little education, and for a number of years was a sailor on various trading vessels. In 1834 he became a member of the 'Young Italy' party, and being condemned to death for his share in the schemes of Mazzini, escaped to Marseilles, took service in the fleet of the Bey of Tunis, and finally went to South America. In the service of the Republic of Rio Grande against the Brazilians he became known as a brilliant leader, and with his famous Italian legion he subsequently gave the Monte Videans such effective aid against Buenos Ayres as to earn the title of 'hero of Monte Video.' In 1848 he returned to Italy, raised a band of volunteers, and harassed the Austrians until the cessation of hostilities and re-establishment of Austrian supremacy in Lombardy. He then retired to Switzerland, but in the spring of 1849 proceeded to Rome to support Mazzini's republic. He was appointed to command the forces, but the odds were overwhelming, and after a desperate defence of thirty days Garibaldi escaped from Rome with 4000 of his followers. In the course of his flight his wife Anita died from fatigue and privations. He reached the United States, and was for some years in command of a merchant vessel. He then purchased a part of the small island of Caprera, off the north coast of Sardinia, and made this his home for the rest of his life. Latterly the subscriptions of his admirers enabled him to become owner of the whole island. In the war of 1859, in which Sardinia recovered Lombardy, Garibaldi and his Chasseurs of the Alps did splendid service; and on the revolt of the Sicilians in 1860 he crossed to the island, wrested it after a fierce struggle from the King of Naples, recrossed to the mainland and occupied Naples, where he was proclaimed Dictator of the Two Sicilies. It was now feared that Garibaldi might prove untrue to his motto—Italy and Victor Emmanuel—but he readily acquiesced in the annexation of the Two Sicilies to Italy, and declining all honours retired to his island farm. In 1862 he endeavoured to force the Roman question to a solution, and entered Calabria with a small following, but was taken prisoner at Aspromonte by the royal troops. He was soon released, however, and returned to Caprera. In 1864 he received an enthusiastic welcome in Britain. In 1866 he commanded a volunteer force against the Austrians in the Italian Tyrol, but failed to accomplish anything of consequence. Next year he attempted the liberation of Rome, but near Mentana was defeated by the French and pontifical troops, and was again imprisoned by the Italian government, but soon pardoned and released. In 1870 he gave his services to the French republican

government against the Germans, and with his 20,000 men rendered valuable assistance in the south-east. At the end of the war he was elected a member of the French assembly, but speedily resigned his seat and returned to Caprera. Rome now became



Giuseppe Garibaldi.

the capital of united Italy, and here in January, 1875, Garibaldi took his seat in the Italian parliament. The latter part of his life was spent quietly at Caprera. After 1870 he wrote two or three novels—very mediocre productions. He died somewhat suddenly June 2, 1882. His autobiography has been published in English.

Gariep (ga-rēp′). See *Orange River*.

Garigliano (gä-ril-yä-nō), a river of S. Italy, formed by the junction of the Liri and Sacco near Pontecorvo. After a course of 40 miles it falls into the Gulf of Gaëta; but if the Liri is regarded as the same stream, its length is more than double.

Garlic (*Allium sativum*), a hardy, perennial allied to the onion, indigenous to the south of Europe, and forming a favourite condiment amongst several nations. The leaves are grass-like, and differ from those of the common onion in not being fistulous; the stem is about 2 feet high; the flowers are white; and the root is a compound bulb, consisting of several smaller bulbs, commonly denominated *cloves*, enveloped by a common membrane. It has a strong, penetrating odour, and a pungent acrid taste. Used as a medicine it is stimulant, tonic, and promotes digestion; it has also diuretic and sudorific qualities, and is a good expectorant.—*Oil of garlic* is a sulphide of allyl, $(C_3H_5)_2S$, a colourless, strongly-smelling oil, exceedingly irritant to the palate and the skin. It is contained also in the onion, leek, asafœtida, &c.

Garnet, a beautiful mineral, or group of minerals, classed among the gems, and occurring generally in mica-slate, hornblende-slate, gneiss, and granite, usually as more or less regular crystals of from twelve to sixty or even eighty-four sides. The prevailing colour is red of various shades, but often brown, and sometimes green, yellow, or black. They vary considerably in composition, but admit of classification into three principal groups according to their chief sesquioxide basic components, viz. alumina, iron, and chrome garnets. Among the varieties are common garnet, pyrope, alamandine, precious or oriental garnet, allochroite, melanite or black garnet, &c. By jewellers garnets are classed as Syrian, Bohemian, or Cinghalese, rather, however, from their relative value and fineness than as necessarily implying that they came from these places. The first, named after Syrian, in Pegu, long the chief mart for garnets, are the most esteemed, being a violet-purple unmixed with black and taking an orange tint by artificial light. The Bohemian garnet is usually a dull poppy red with hyacinth orange tint when held between the eye and the light; the pyrope is a full crimson form of this class. Coarse garnets reduced to powder are sometimes used in place of emery for polishing metals.

Garof′alo, BENVENUTO (properly *Benvenuto Tisio da Garofalo*), an Italian historical painter, born at Ferrara in 1481. He painted at Cremona and at Rome, where he became intimate with Raphael, and then returned to Ferrara, where he died blind in 1559. His works show the influence of the Lombard school and still more of Raphael, though it is denied that he was an imitator of the latter. Examples of his work are to be found in Ferrara, Florence, Rome, and London, and most of the leading galleries.

Garo Hills, a district of India, forming the south-western corner of Assam; area, 3146 sq. miles. It is a mountainous and forest region intersected by tributaries of the Brahmaputra. The native Garos are a robust and active race. Among them the wife is regarded as the head of the family, and property descends through females. Pop. 121,570.

Garonne′ (Lat. *Garumna*), a river of S.W. France, rising in the vale of Aran, in the Spanish Pyrenees; length, about 350 miles.

It enters France and flows north-west to the Atlantic, through Haute-Garonne, Tarn-et-Garonne, Lot-et-Garonne, and Gironde. Below Toulouse it receives, on the left, the Save, Ratz, Gers, Baise, &c.; on the right, the Tarn, the Lot, and the Dordogne, on joining which, it changes its name to the Gironde. It is navigable on the descent from St. Martory, and both ways from Toulouse. The Canal du Midi, joining it at Toulouse, forms a communication between the Atlantic and the Mediterranean at Narbonne, and the Canal Latéral, from Toulouse to Castets-en-Dorthe (Gironde), supplements its direct navigation.

Garonne, HAUTE, a department, south of France, one of the five separated by the Pyrenees from Spain. It is traversed from south to north by the higher reaches of the Garonne and for about 26 miles by the Canal du Midi. The valleys and the lower northern districts are often of great fertility, and cereals and wine are largely exported. Hemp, flax, oranges, and tobacco are also much grown. The principal mines are lead, copper, coal, antimony, iron, and zinc, and a fine marble is quarried. There is a large transit trade with Spain. Capital of department, Toulouse. Area, 2529 sq. miles. Pop. 481,169.

Garrick, DAVID, actor, born at Hereford, Feb. 20, 1717. His grandfather was a French refugee, his father a captain in the army. He was educated at Lichfield grammar-school, spent a short time at Lisbon with an uncle, and returning to Lichfield was placed under Samuel Johnson, who was induced to accompany him to the metropolis (1737). Garrick then began to study for the law, but on the death of his father joined his brother Peter in the wine trade. He had, however, as a child a strong passion for acting, and in 1741 he joined Giffard's company at Ipswich under the name of Lyddal. At Giffard's theatre in Goodman's-fields he achieved a great success as Richard III., and in 1742 was not less successful at Drury Lane. In 1745 he became joint manager with Mr. Sheridan of a theatre in Dublin, and after a season at Covent Garden (1746) purchased Drury Lane in conjunction with Mr. Lacy, opening it 15th September, 1747, with the Merchant of Venice, to which Dr. Johnson furnished a prologue. From this period may be dated a comparative revival of Shakspere, and a reform both in the conduct and license of the drama. In 1763 he visited the Continent for a year and a half. He had already written his farces of The Lying Valet, Lethe, and Miss in her Teens; and in 1766 he composed, jointly with Colman, the excellent comedy of The Clandestine Marriage. After the death of Lacy, in 1773, the sole management of the theatre devolved upon Garrick, until 1776, when he sold his moiety of the theatre for £37,000, performed his last part, Don Felix in The Wonder, for the benefit of the theatrical fund, and bade an impressive farewell to the stage. He died January 20, 1779, and was buried with great pomp in Westminster Abbey. Besides the pieces mentioned he wrote some epigrams, a number of prologues and epilogues, and a few dramatic interludes. As a man Garrick was highly respected, the chief defect of his character being vanity. As an actor he has probably never been excelled, and he was almost equally great both in tragedy and in comedy. He left a large fortune.

Gar'rison, a body of troops stationed in a fortified place (fort, town, or castle) to defend it or keep the inhabitants in subjection.

Gar'rison, WILLIAM LLOYD, American journalist and founder of the anti-slavery movement in the United States, born 1805. He was apprenticed to a shoemaker, but eventually became a compositor on the Newburyport Herald. In 1827 he became editor of the National Philanthropist, the first American temperance journal, and afterwards of a journal in support of the election of John Quincy Adams. With Mr. Lundy, a Quaker, he then started the paper called the Genius of Universal Emancipation (1829), his denunciations of slave-traders leading to his imprisonment for libel. On his release he commenced lecturing in Boston, started the Liberator (1831), published weekly with the aid of one assistant and a negro boy. In 1832 appeared his Thoughts on African Colonization, and in the same year he established the American Anti-Slavery Society. He subsequently visited England, where he was welcomed by Wilberforce, Brougham, Buxton, and others. In 1835 he was saved with difficulty from a Boston mob; but his principles made steady progress until 1865, when the Anti-Slavery Society was dissolved with its work accomplished. He died at New York, 1879. A volume of sonnets (1843) and one of selections (1852) bear his name.

Garrot, the common name given to the ducks of the genus *Clangŭla*, of the oceanic

section of the duck family, having the bill shorter than the head, widely distributed over the temperate regions of Europe and America. The golden-eyed garrot (*C. chrysophthalmus*) is a common species in Britain, its general colour being white beneath, with head and sides of neck rich green, back and tail bluish or grayish-black, and the bill bluish-black. It has a round white spot before each eye, and two white bands on the wing; the female is ashy, with rufous head; length of male about 19 inches. The harlequin garrot (*Clangula histrionica*) is also a winter visitant in Great Britain.

Garrote (găr-rō'tā), a mode of punishment in Spain by strangulation, the victim being placed on a stool with a post or stake (Spanish, *garrote*) behind, to which is affixed an iron collar with a screw; this collar is made to clasp the neck of the criminal, and drawn tighter by means of the screw till life becomes extinct. This word, with the French spelling and pronunciation *garrotte*, has become naturalized in Great Britain as a term for a species of robbery effected by throttling the victim and stripping him while insensible.

Garrow Hills. See *Garo Hills*.

Gar'rulus, a genus of insessorial birds of the crow family, containing the jays.

Garrya, a genus of opposite-leaved evergreen shrubs, natives of California, Mexico, Cuba, and Jamaica. *G. elliptica* is a handsome garden plant with long drooping necklace-like catkins of pale yellow flowers.

Garter, Order of the, the highest and most ancient order of knighthood in Great Britain. The origin of the order, though sometimes assigned to Richard I., is generally attributed to Edward III., the legend being that the Countess of Salisbury having dropped her garter while dancing, the king restored it, after putting it round his own leg, with the words, which became the motto of the order, '*Honi soit qui mal y pense*'—Shame be to him who thinks evil of it. The date of the foundation or restoration by Edward III. of the order, as given by Froissart, is 1344, while other authorities, founding on the statutes of the order, assign it to 1350. The statutes of the order have been repeatedly revised, more particularly in the reigns of Henry V., Henry VIII., Edward VI., and George III.—the last in 1805. Ladies are said to have been admitted up till the reign of Edward IV. Until the reign of Edward VI. the common title of the order was the Order of St. George, and it still bears this title, as well as that of the Garter. The original number of knights was twenty-six, including the sovereign, who was its permanent head; and this number is still retained, except that by a statute passed in 1786 princes of the blood are admitted as supernumerary members. The peculiar emblem of the order, the garter (5), a dark-blue ribbon edged with gold, bearing the motto and with a gold buckle and pendant, is worn on the left leg below the knee. The mantle is of blue velvet, lined with white taffeta, the surcoat and hood of crimson velvet, the hat of black velvet, with plume of white ostrich feathers, having in the centre a tuft of black heron's feathers. The collar of gold (3) consists of knots alternating with garters inclosing roses, with the badge of the order, called the George (4), pendent from it. This consists of a figure of St. George on horseback fighting the dragon. The lesser George (2) is worn on a broad blue ribbon over the left shoulder. The star (1), formerly only a cross, is of silver, and consists of eight points, with the cross of St. George in the centre, encircled by the garter. A star is worn by the knights on the left side when not in the dress of the order. The officers of the order are the prelate, the Bishop of Winchester; the chancellor, the Bishop of Oxford; the registrar, Dean of Windsor; the garter king of arms, and the usher of the black rod. There are a dean and twelve canons, and each knight has a knight-pensioner.



Insignia of the Garter.

Garter-fish. See *Scabbard-fish*.

Garter King of Arms, the head of the heraldic establishment in England, consisting of three kings of arms—Garter, Clarencieux, and Norroy, and the herald of the military order of the Garter. The office of garter king of arms was instituted by Henry V. in 1417. The duties of the garter king

of arms are principally to grant heraldic supporters, to arrange royal funerals, and to present the order of the Garter to foreign princes.

Garth, SIR SAMUEL, a physician and poet, born not later than 1670; educated at Peterhouse, Cambridge; made a fellow of the College of Physicians, 1692. A division among the medical profession on the establishment of a dispensary for the metropolitan poor was the occasion of his successful mock-heroic poem, The Dispensary (1699). He became the chief Whig physician, as Radcliffe was chief physician with the Tories, and on the accession of George I. was knighted, and appointed physician in ordinary to the king, and physician-general to the army. He died in 1719. Of his other works, Claremont, a moral epistle in verse (1715) was the chief.

Garvie, GARVIE HERRING, the name in Scotland for the sprat, *Harengula* (*Clupea*) *sprattus*.

Gas, an elastic aeriform fluid, a term originally synonymous with air, but afterwards restricted to such bodies as were supposed to be incapable of being reduced to a liquid or solid state. Under this supposition gas was 'a term applied to all permanently elastic fluids or airs differing from common air.' After the liquefaction of gases by Faraday, the old distinction between gas and vapour, viz. that the latter could be reduced to a liquid or solid condition by reduction of temperature and increase of pressure, while a gas could not be so altered, was no longer tenable, so that the term has resumed nearly its original signification, and designates any substance in an elastic aeriform state. *Gases* are distinguished from *liquids* by the name of *elastic* fluids; while liquids are termed *non-elastic*, because they have, comparatively, no elasticity. But the most prominent distinction is the following:—*Liquids* are compressible to a certain degree, and expand into their former state when the pressure is removed; and in so far they are elastic, but *gases* appear to be in a continued state of compression, for when left unconfined they expand in every direction to an extent which has not hitherto been determined. In respect of this indefinite expansiveness, all gaseous bodies obey more or less strictly two laws, commonly called the 'gaseous laws.' The first, known as the law of Boyle and Mariotte, given first by Robert Boyle in 1662, and then by Mariotte in 1676, is that—*The volume of a given mass of gas varies inversely with the pressure to which the gas is subjected;* or, in other words, the *density* of a given mass of gas is in direct proportion to the pressure that the gas is subjected to. The second of the gaseous laws is commonly called the law of Dalton and Gay-Lussac. It is, however, properly called Charles' law. Dalton published it in 1801; but Gay-Lussac, who stated it in 1802, gives the credit of having discovered it, fifteen years previously, to Citizen Charles. The law may be stated as follows:—The volume of a gas maintained under constant pressure increases for equal increments of temperature by a constant fraction of its original volume; and this fraction is the same whatever is the nature of the gas. A mass of gas, whose volume is 1000 at 0° C., becomes, at 100° C., 1366·5, the pressure remaining constant. In virtue of these laws a gas may now be defined to be a substance possessing the condition of perfect fluid elasticity, and presenting under a constant pressure a uniform state of expansion for equal increments of temperature—a property distinguishing it from vapour. There is, however, no known gas that obeys these two laws perfectly: thus, of the six gases whose liquefaction has been attended with most difficulty (oxygen, hydrogen, nitrogen, carbonic oxide, nitric oxide, and light carburetted hydrogen), all except hydrogen are more compressible than they should be theoretically, while hydrogen deviates slightly in the opposite direction, being less compressible than Boyle's law would indicate. The other gases exhibit even greater deviations from Boyle's law, and the amount of the deviation rapidly increases as the gas is brought nearer and nearer to liquefaction. The law of Dalton or Charles which gives for equal elevations of temperature equal increments of volume is also deviated from by every gas, and more and more so as the point of liquefaction is approached.

The liquefaction of gases is effected by the application of cold or pressure, or both combined. For any given pressure there is a particular temperature at which the gas liquefies. At a certain point, however, called by Andrews the *critical point of temperature*, the distinction between liquid and gas appears completely lost. At and above this temperature no pressure that can be applied will convert the fluid into the form of a liquid even though the volume is diminished by pressure so much as to make

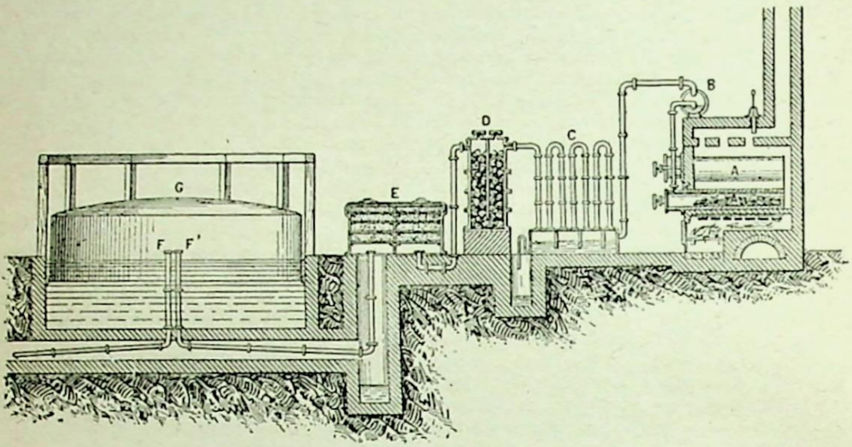
the density of the fluid greater than that of the liquid obtained at lower temperatures. By 1878 all gases had been liquefied.

The power of motion inherent in all parts of aeriform matter is accounted for by the kinetic theory of gases, according to which a gas consists of an enormous number of molecules moving about with very great velocity. Great as is their number, however, the molecules are sparsely distributed through space, in comparison with their distribution when the substance is in the solid or liquid condition. A molecule of a gas flying about moves on in a straight line till it meets another molecule, or till it impinges on a side of the containing vessel. Meeting another molecule the two turn each other aside, just as two billiard balls when they come into collision are both deflected from their previous paths. Passing thence each flies on in a straight line till it meets a fresh molecule, and each is again deflected. When the molecules impinge on the side of the vessel that contains the gas they rebound as a billiard ball does from the cushion of the billiard table; and the perpetual shower of molecules that strike and rebound from the sides gives rise to the phenomenon of gaseous pressure, just as an umbrella held out in a hail-storm is pressed downwards owing to the numerous impulsive blows that act upon it. When the temperature of a gas is raised the energy of the molecules is increased. They strike with greater velocity, and the number of blows on the side of the vessel is also increased. The pressure is therefore greater; and the law of Dalton or Charles is easily shown to be a consequence of the kinetic theory. Boyle's law also follows very simply from it; for if we diminish the volume of the containing vessel to one-half, one-third, or to any other fraction of its original volume, we increase the number of molecules in a given space, a cubic inch for instance, in the same ratio. Consequently, the number of impacts on a square inch of the surface of the containing vessel will also be increased in the same ratio, and the pressure will thus be increased in that ratio too. It is estimated that in a cubic centimetre of gas at standard temperature and pressure there are nineteen million million million molecules.

Gas, Lighting by, as ordinarily understood, the application of carburetted and bicarburetted hydrogen gas, that is *olefiant gas*, to the lighting of buildings, streets, &c. In 1739 the Rev. Mr. Clayton published a paper in the Philosophical Transactions, on the inflammable nature of the gases obtained by the decomposition of pit-coal in heated close vessels; but no practical application of this discovery was made before 1792, when Mr. W. Murdoch, a native of Ayrshire, in the employ of Messrs. Watt and Boulton, lighted his own house and offices at Redruth on this principle. In 1798 he erected a gas apparatus on a large scale at Soho Foundry, Birmingham, and in 1802 M. Le Bon lighted his house in Paris by gas, and made a proposal to supply the whole city. In 1803 Mr. Winsor exhibited gas illuminations at London in the Lyceum, and afterwards raised the sum of £50,000 from a number of subscribers who formed themselves into a National Light and Heat Company (1810). With this money Mr. Winsor lighted Pall Mall, but was soon succeeded by Mr. Samuel Gleg, who invented the hydraulic main, the wet-lime purifier, and the wet gas-meter. From this time coal gas became the most common illuminating agent wherever it could be prepared economically. Another kind of gas for lighting has lately come into use to some extent, namely, *water-gas*, produced from the decomposition of water in the form of steam by passing it through incandescent fuel. See *Water-gas*.

Gas is obtained from coal, the best sorts being those bituminous coals known in England by the name of *cannel*, and in Scotland by the name of *parrot*. The coal is distilled in retorts of cast-iron (A), or now more generally of fire-clay, heated to a bright red heat. As they issue from the retort into the hydraulic main (B) the products of distillation contain vapours of tar and naphtha, together with steam impregnated with carbonate of ammonia and hydrosulphate of sulphide of ammonium. These vapours would condense in the pipes in which the gas must be distributed, and would clog them up; they must therefore be so far removed by previous cooling as to cause no inconvenient condensation at ordinary temperatures. The crude gas contains, besides, sulphuretted hydrogen, the combustion of which would exhale an offensive odour. Carbonic acid weakens the illuminating power of the gas, and has also to be removed. In the hydraulic main—a large horizontal pipe at first about half-filled with water—some separation is effected between the liquid products of distillation and the gaseous, which bubble up through the

liquid into the upper portion of the main. At the end of the main the liquids fall by their greater gravity into the sunk reservoir known as the tar-well, while the gas is conducted to the condenser or refrigerator (C), a series of bent iron tubes kept cool either by exposure to currents of air or by allowing water to flow over them. In these there is a further deposit of tar and water, and the gas passes on to the washer, a series of cells in which the gas is forced through water or exposed to water spray for the removal of ammonia. The scrubber (D), which is sometimes used in place of the washer, is a large chamber filled with coke kept constantly wet with sprays of water. The gas in passing up the scrubber leaves its last traces of ammonia and its compounds, and then enters the purifiers (E), which are iron chambers containing a series of perforated trays on which are spread slaked lime (in the form of dry hydrate), or a mixture of sawdust and oxide of iron. These remove carbonic acid and the greater portion of the sulphur com-



Gas-work, shown in section.

pounds, and the gas is then conveyed by means of a pipe (F′) to the gas-holder (G), a store-house or reservoir, in which it is subjected to uniform pressure, and from which it is discharged (F) into the street or other mains in the constant stream necessary to produce a steady flame from the burners in the houses of those using it. The gas-holder, sometimes called a *gasometer*, is usually a very large cylindrical air-tight structure of iron plates, closed at top, open below, and having the lower end immersed in a water reservoir. It is supported by chains passing over pulleys on iron columns, the greater part of the weight of the gas-holder being counterbalanced by weights attached to the chains, so that it can exercise a certain regulated pressure on the gas contained in it.

The quantity of gas used by each consumer is measured by an instrument called a meter, of which there are two classes—the wet and the dry. The wet meter is composed of an outer box about three-fifths filled with water. Within this is a revolving four-chambered drum, each chamber being capable of containing a definite quantity of gas, which is admitted through a pipe in the centre of the meter, and, owing to the arrangement of the partitions of the chambers, causes the drum to maintain a constant revolution. This sets in motion a train of wheels carrying the hands over the dials which mark the quantity of gas consumed. The dry meter consists of two or three chambers, each divided by a flexible partition or diaphragm, by the motion of which the capacity on one side is diminished while that on the other is increased. By means of slide-valves, like those of a steam-engine, worked by the movement of the diaphragms, the gas to be measured passes alternately in and out of each space. The contractions and expansions set in motion the clockwork which marks the rate of consumption. The diaphragms in all the chambers are so connected that they move in concert.

The profitable consumption of gas, whereby the strongest light can be had at the least expenditure of gas, depends considerably upon the form of the burner, and the mode by which the flame is fed with the air necessary for its combustion. There must be a sufficient supply of oxygen to convert the carbon of the gas into carbonic acid, and the hydrogen into water. If there is not a sufficient supply of oxygen, the flame will be smoky from excess of carbon. In this case the remedy is either to reduce the supply of gas or increase the supply of air. This may be effected by modifying the form of the burner, or in the case of the Argand burner by having a different shape of glass chimney. As to the form of the burner, it has been found that a plain jet $\frac{1}{4}$ inch in diameter at the orifice, will not give a flame free from smoke of a greater height than $2\frac{1}{2}$ inches; but the same quantity of gas which would give a smoky flame from a plain jet, will produce a clear bright flame by extending or dividing the aperture of the jet so as to expose a larger surface of flame to the atmosphere. It is not, however, necessary to increase the superficial area of the flame; it may even be diminished with a more intensely luminous effect by having instead of one aperture two small ones pierced at an angle to each other, so that the jets may cross each other. This forms the union jet. Another form is the slit or batwing burner, in which a clean slit is cut across the top of the beak. In the Argand burner a circle of small holes supplies the gas, and a current of air is admitted through the centre of the flame, which is steadied and considerably increased in brilliancy by being surrounded by a glass chimney. For the lighting of large halls an improvement called the sunlight has been introduced. This consists of rings of union jets placed horizontally and set on the base of a cone, which passes through the ceiling and leads off the products of combustion through a flue, thus ventilating as well as lighting the place in which they are used.

Gascoigne (-koin'), GEORGE, English poet, born 1535, educated at Cambridge, admitted to Gray's Inn in 1555. Being disinherited by his father, he served with distinction in Holland and was made prisoner by the Spaniards, but returned safely to England, and died at Stamford in 1577. He is chiefly remembered for his blank-verse satire, The Steele Glas (1576), and the Complaynt of Philomene, a rhyming elegy (1576), but he wrote two or three comedies and tragedies.

Gascoigne, SIR WILLIAM, an English judge of the Court of King's Bench, born about 1350, died in 1419. He is chiefly famous for directing the imprisonment of the Prince of Wales (afterwards Henry V.), who had struck him in open court for condemning one of his dissolute friends. He also declined to obey the king and sentence Archbishop Scroop to death, alleging that the law gave him no power over the life of an ecclesiastic. In each case the king ultimately approved his action.

Gas'cony, an old division of France, between the Garonne, the sea, and the Pyrenees. It composes the departments of Hautes Pyrénées, Gers, and Landes, with part of those of Bas Pyrénées, Haute Garonne, Lot-et-Garonne, and Tarn-et-Garonne. The Gascons, who are of mixed Basque and Gothic descent, used to have the character of being brave, faithful, and peculiarly tenacious of purpose, but much given to boasting, whence the word *gasconnade.*

Gas Engine, an engine in which the movement of the piston is caused by the explosive energy of a mixture of inflammable gas with atmospheric air. After various attempts by Huyghens, Pepin, and others to utilize explosive agents like gunpowder in working machines, a French artisan, Lebon, patented in 1799 an engine in which energy was obtained by exploding charges of coal-gas mixed with air on each side of the piston alternately, the explosion being effected by an electric spark. Modifications of this engine were patented by Lenoir in 1860, by Hugon, and by Messrs. Siemens. The most satisfactory are probably those known as Brayton's High-pressure Gas Engine, and Otto's Gas Engine. The latter consists of an upright cylinder in which works a heavy piston, the rod of which forms a rack-gearing with a cog-wheel on the shaft of the fly-wheel. As the piston ascends the cog-wheel slips loosely on the shaft; as it descends its energy is transferred to the shaft through the cog-wheel, the force of the down-stroke being due to the rapid condensation of the gases after the explosion aided by the weight of the piston itself. The mixed gases—coal-gas and air—are introduced at the base of the cylinder and fired, as in Hugon's patent, by communication with a gas-jet kept constantly burning. The great objection to this engine—its noise in working—has been

overcome in the Otto Silent Gas Engine, in which the working cylinder is horizontal and considerably shorter than in the old form.

Gas-holder, Gas-meter. See *Gas* (*Lighting by*).

Gas'kell, ELIZABETH CLEGHORN, novelist, daughter of William Stevenson, editor of Scott's Magazine, born at Chelsea in 1810. She was brought up by an aunt at Knutsford in Cheshire (the original of the village in her story of Cranford); married in 1832 the Rev. William Gaskell, a Unitarian minister at Manchester; and died at Alton, Hampshire, in 1865. Her first work of importance, Mary Barton, appeared in 1848, based upon the struggles then rife in Lancashire between workmen and employers. The Moorland Cottage, a Christmas story, appeared in 1850; and in 1853, her next regular novel, Ruth, which aims a distinct blow at the common moral judgments of society. Lizzie, Cranford, and other minor tales appeared at various times in Household Words, in which also she wrote her next novel, North and South, a Yorkshire tale. In 1857 appeared her admirable Life of Charlotte Brontë, and in 1860 Sylvia's Lovers. Wives and Daughters appeared posthumously in 1866.

Gaskets, cords fastened to the sail-yards of a ship, and used to furl or tie up the sail firmly to the yard by wrapping round both.

Gaspé, a district of Canada, prov. Quebec, on the south of the St. Lawrence estuary, and washed by the Gulf of St. Lawrence, of which Gaspé Bay is an inlet. The fisheries are valuable; Gaspé Basin is a port on Gaspé Bay.

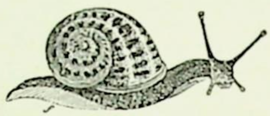
Gassen'di (properly GASSEND), PIERRE, French philosopher and mathematician, born in 1592. At nineteen he was appointed to the chair of philosophy at Aix. His Exercitationes Paradoxicæ adversus Aristotelem (1624), while they gave great offence to the Aristotelians, obtained him a canonry in the cathedral of Digne; but a second book of Exercitationes excited so much enmity that he ceased all direct attacks on Aristotle, contenting himself with the exaltation of Epicurus. He strenuously maintained the atomic theory, in opposition to the views of the Cartesians, and, in particular, asserted the doctrine of a vacuum. He was appointed lecturer on mathematics in the Collége-Royal at Paris in 1645, but was compelled to return to Digne from 1647 to 1653, in which interval he published his De Vita, Moribus et Doctrina Epicuri (1647), and Syntagma Philosophiæ Epicuri (1649). In 1653 he went again to Paris, where he published the lives of Tycho Brahe, Copernicus, Peurbach, and Regiomontanus (John Müller). He died in 1655.

Gas-tar. See *Coal-tar.*

Gastein, or WILDBAD GASTEIN, a watering-place in Austria, 3000 feet above the sea, 48 miles south of Salzburg, with thermal springs (64° to 100°) containing salt and carbonates of magnesia and lime. It gives the name to a treaty signed here in 1865 by the Emperor of Austria and the King of Prussia, the non-observance of which led to the German war of 1866.

Gasteromyce'tes. See *Fungi.*

Gas'teropods (Gasteropoda), a class of molluscs, consisting of animals inhabiting a univalve shell, although some of the group are wholly destitute of a shell. The shell is either a small internal plate, as in slugs; or



A Gasteropod.

Common Garden-snail (*Helix aspersa*). *f*, Foot extending the whole length of the under side of the body.

cone-shaped and spiral, as in the majority; or multivalve, the pieces following each other along the middle line, as in the chitons. No known gasteropod has a bivalve shell. The distinguishing characteristic is the foot, which is broad, muscular, and disc-like, and attached to the ventral surface. The class is divided into two sub-classes, the Branchiata or Branchiogasteropoda, breathing water by gills, and the Pulmonata or Pulmogasteropoda, breathing air by a sort of lung apparatus. The former include whelks and periwinkles, &c.; the latter include the ordinary land-snails, slugs, pond-snails, &c.

Gasteros'teus, the genus comprising the sticklebacks.

Gaston de Foix (fwä), Duke of Nemours, French soldier, born 1489, son of John de Foix, count d'Estampes, and Mary of Orleans, sister of Louis XII., whose favourite he became. At the age of twenty-three he routed a Swiss army, rapidly crossed four rivers, drove the pope from Bologna, and won the celebrated battle of Ravenna (1512), but was killed while attempting to cut off a body of retreating Spaniards.

Gastor'nis, a large fossil bird of more than one species, remains of which have been

discovered in the lower Eocene deposits of Meudon, near Paris, and elsewhere. The bones indicate a bird as tall as the ostrich, and its structural peculiarities point to affinities with the Grallatores or wading-birds.

Gastralgia, a severe pain in the stomach, generally arising from indigestion.

Gastric Juice, a clear colourless fluid with a saline taste and sour odour secreted by the mucous membrane of the stomach, and chief agent in the process of digestion. It is acid, and contains pepsin, its essential nitrogenous principle. The activity of the fluid has been ascribed to various acids present, lactic, acetic, and butyric; but it appears that free hydrochloric acid is that which is secreted by the stomach, the others being the products of change of food undergoing digestion. The acid is necessary for the pepsin to exercise its properties, which are limited to the conversion of nitrogenous substances into *peptones*, fatty matters not being affected by it. (See *Pepsin*.) Gastric juice also holds in solution various inorganic salts, chiefly chlorides and phosphates, occasionally also abnormal substances such as urea, ammonia, salts, and biliary acids. It is not possessed of any marked reactions with ordinary chemical reagents, does not become turbid by boiling, and gives no striking precipitates with acids, alkalies, or mineral salts. The amount secreted daily in the human adult is estimated to be about 14 pounds, but as it is continually reabsorbed, there is no great quantity present at any one time.

Gastric System, all the parts of the body which contribute to digestion.

Gastri′tis, or GASTRO-ENTERITIS. See *Enteritis*.

Gastrocne′mius, the most external of three superficial muscles forming the calf of the leg and terminating above the heel in the *tendo Achillis*.

Gastrolo′bium, a large genus of leguminous plants occurring in South-western Australia. Several of the species often prove fatal to cattle who eat of their foliage, and they are hence known as poison-plants.

Gastromalacia, softening of the stomach, a disease occurring in infants.

Gastros′tomy, the operation of forming an artificial opening into the stomach with the view of introducing food when it cannot be received naturally on account of obstruction or stricture of the gullet. The operation has not yet been successfully performed on the human subject.

Gastrot′omy, in surgery, the operation of making an incision in the abdomen in order to remove some diseased part or foreign body.

Gates, HORATIO, an American officer during the revolutionary war, born in England in 1728. He rose to the rank of major by merit alone. At the capture of Martinique he was aide-de-camp to General Monkton, and he was with Braddock when the latter was defeated in 1755. On the conclusion of peace he purchased an estate in Virginia, on which he resided until the revolutionary war in 1775, when he was appointed adjutant-general by Congress, with the rank of brigadier. At the head of the American army of the north he compelled the British general Burgoyne to surrender his whole army at Saratoga (1777). In 1780, after the capture of General Lincoln, Gates received the chief command of the southern districts, but was defeated two months later by Cornwallis at Camden. He was then superseded by General Greene and brought to court-martial, but was finally acquitted, and reinstated in his command in 1782 after the capture of Cornwallis. He then retired to Virginia, and in 1790, having emancipated all his slaves, he removed to New York, where he died in 1806.

Gateshead, parliamentary and municipal borough, England, county Durham, on the right bank of the Tyne, opposite Newcastle, of which it is practically part, being connected with it by three bridges. The industrial establishments include works where heavy articles in iron, such as girders, anchors, and chain-cables, as well as engines, &c., are made; ship-building yards, roperies, brass, copper, and iron foundries; paper, glue, vinegar, glass, artificial manure, and large chemical works. In the vicinity are quarries from which the celebrated 'Newcastle grindstones' are obtained, and numerous collieries. The town sends one member to the House of Commons. Pop. (1891), 85,709.

Gath (Hebrew, 'wine-press'), one of the five royal cities of the Philistines, which, from its situation on the borders of Judah, was of much importance in the wars of the Jews and Philistines. It was the native town of Goliath, and was successively captured by David, Hazael, and Uzziah, who dismantled it. The site cannot be determined with certainty, but it is sometimes identified with Tell-es-Sâfieh, between Ekron and Ashdod.

Gatineau (gat-i-nō'), a river of Canada, Quebec province, the largest affluent of the Ottawa, rising in some lakes, and flowing almost due south to enter the Ottawa nearly opposite Ottawa city. It is not navigable more than five miles above the Ottawa except by canoes, but its rapid waters are well stocked with fish, and available as water-power. The country through which it flows is, however, only partially settled.

Gatling-gun. See *Machine-gun.*

Gat'shi-na, a town, Russia, government of, and 35 miles s.s.w. of St. Petersburg, on a small lake. It is regularly built, and contains one of the finest of the imperial palaces of Russia. Pop. 10,063.

Gau (gou), a German word of doubtful origin, meaning in general district, but in a special sense a district as a political unit, and its inhabitants as a political association. It formed a sort of middle division between the highest unit, the state, and the lowest, the village, corresponding in some respects to the 'hundred.' The freemen of the Gau met at certain periods, under an elected head, to settle matters relating to the public weal; and in the same way the head men of the Gauen met to settle matters relating to the state at large. In the Frankish Empire the character of the Gau was altered, each Gau now having as its head one or more royal officers called grafs or counts. These countships became hereditary, and about the 12th century the Gau ceased to exist as a political division, though the name has survived in Aargau, Thurgau, &c.

Gauchos (gä'ų-chōs), natives of the Pampas of the La Plata countries in S. America, of Spanish descent. The race is noted for their spirit of wild independence, for horsemanship and the use of the lasso. Their mode of life is rude and uncivilized, and they depend for subsistence chiefly on cattle-rearing.

Gauge (or GAGE), STEAM AND WATER, the instruments fixed to engine boilers for registering the force of steam and the level of the water. The first often consists of a siphon tube, with equal legs, half-filled with mercury. One end is fastened into a pipe, which enters that part of the boiler which contains the steam; the other end is open to the atmosphere. The steam, acting on the mercury in one leg of the gauge, presses it down, and the mercury in the other leg rises, the difference between the two columns being the height of mercury which corresponds to the excess of the pressure of the steam in the boiler above the pressure of the atmosphere; or, in other words, to the effective pressure on the safety-valve. For high-pressure engines the steam-gauge usually consists of a spiral tube into which the steam is admitted, and which becomes less bent the greater the pressure. The water-gauge is a vertical glass tube, or flat case, communicating above and below with the boiler. Gauge-cocks are sometimes put instead of, or in addition to the tubes, for enabling the engineer to verify the level of the water.

Gauge, a standard of measurement. As applied to railways, gauge signifies the distance between the centres of each pair of rails, which in the ordinary or narrow gauge is 4 feet 8½ inches. The broad gauge, as in the Great Western Railway of England, is 7 feet; the Irish, Indian, and Spanish gauge is 5 feet 6 inches. Special narrow gauges have recently been adopted for mountain and mineral lines, such as the 3 feet 6 inch gauge of the Norwegian lines. Gauge is also the name applied to various contrivances for measuring any special dimension, such as the wire-gauge, an oblong plate of steel, with notches of different widths cut on the edge and numbered, the size of the wire being determined by trying it in the different notches until one is found which it exactly fits. The thickness of sheet-metal is tried by a similar gauge.

Gaul, GALLIA, in ancient geography, the country of the Gauls, the chief branch of the great original stock of Celts. It extended at one time from the Pyrenees to the Rhine, and included also a part of Italy. Hence it was divided into Gaul on this side (the Roman side) of the Alps, or Gallia Cisalpina, and Gaul beyond the Alps, or Gallia Transalpina. Latterly the former was regarded quite as part of Italy, and the name Gallia was restricted to Transalpine Gaul, or the country nearly corresponding to modern France. Julius Cæsar, about the middle of the first century B.C., found Transalpine Gaul divided into three parts: 1. Aquitania, extending from the Pyrenees to the Garonne, chiefly occupied by Iberian tribes; 2. Gallia Celtica, Celtic Gaul, from the Garonne to the Seine and Marne; 3. Gallia Belgica, Belgic Gaul, in the north, extending to the Rhine.

Migrations among the Gauls about 397 B.C., and their passage of the Alps, first bring the Gallic nation into the region of history. Having crossed the Alps they fell upon the

Etruscans, defeated the Romans at Allia (390 B.C.), and sacked and burned Rome, the capitol, however, being saved by Camillus. More than a century after the burning of Rome, the eastern Gauls, in 280–278 B.C., made three destructive irruptions into Macedonia and Greece. Several tribes pursued their course into Asia Minor, where, under the name of *Galatians*, they long retained their national peculiarities. After these migrations the Gauls along the banks of the Danube and in the south of Germany disappear. Tribes of German origin occupy the whole country as far as the Rhine, and even beyond that river. The Belgæ, who were partly German, occupied the northern part of Gaul, from the Seine and Marne to the British Channel and the Rhine, from whence colonists passed over into Britain, and settled on the coast districts. The Celts in Gaul had attained some degree of cultivation by intercourse with the Greeks and Carthaginians before they came in contact with the Romans. Those of Cisalpine Gaul continued formidable to Rome until after the first Punic war, when the nation was compelled as the result of a war of six years to submit to the Romans (220 B.C.). When Hannibal marched on Rome they attempted to shake off the yoke; but the Romans, victorious over the Carthaginians, reduced them again to submission. Thirty-one years later (189 B.C.) their kindred tribe in Asia, the Galatians, met with the same fate; they also were vanquished, and their princes (tetrarchs) became tributary. In the years 128–122 B.C. the Romans conquered the southern part of Gaul along the sea from the Alps to the Pyrenees, and here established their dominion in what was called the Province (Provincia), a name that still exists as Provence. Not long after Gaulish tribes shared in the destructive incursions of the Cimbri and Teutones on the Roman territory, which were ended by Marius in the battles of Aquæ Sextiæ (Aix) in 102, and Vercelli in 101 B.C. On the appointment of Julius Cæsar to the proconsulship over the countries bordering on Gaul, he resolved to subject all Gaul, and executed his purpose in less than nine years (58–50 B.C.), in eight bloody campaigns. The dominion of the Romans in Gaul was confirmed by colonies, and the liberal grant of the Roman citizenship to several Gallic tribes. The religion of the Druids, being suppressed in Gaul by Tiberius and Claudius, gradually retreated into Britain, soon also conquered by the Romans. After the extinction of the Cæsars, the Gauls once more attempted to recover their liberty by aid of the Germans, but after this last effort became entirely Romanized, even their ancient language, the Celtic, being supplanted by a corrupt Latin dialect. About the year 486 the Franks subdued the greater part of Gaul, and put a period to the dominion of the Romans in that country. See *France*.

Gault, in geology, a series of stiff marls or calcareous clays, varying in colour from a light gray to a dark blue, occurring between the Upper and Lower Greensands of the Chalk formation of England. It is developed chiefly in the neighbourhood of Folkestone (hence called *Folkestone marl*) and in Cambridgeshire.

Gauntlet, or GANTLET, a glove made originally of chain-mail, later of plate, and jointed at the fingers, used as part of the armour of a warrior in former times.

Gaur, or GOUR, a ruined city in Hindustan, 60 miles north by west of Murshedabad. From 1212 to 1574 it was the capital of Bengal, extending about 7 miles along the old Ganges. Its decay proceeded from the change in the course of the river, about two centuries since. The principal ruins are a magnificent mosque, faced with black porphyry, two gates, a large edifice faced with bricks of various colours, a lofty obelisk or tower. Several villages now stand on the site of the city.

Gaur, GOUR, one of the largest of all the ox tribe (*Bos gaurus* or *Bibos gaurus*), inhabiting the mountain jungles of India, remarkable for the extraordinary elevation of its spinal ridge, the absence of a dewlap, and its white 'stockings,' which reach above the knee. It is so fierce when roused that neither tiger, rhinoceros, nor elephant dare attack it. The hide on the shoulders and hind-quarters is sometimes nearly 2 inches in thickness even after being dried, and is therefore much valued for the purpose of being manufactured into shields. The animal is supposed to be incapable of domestication.

Gauss (gous), KARL FRIEDRICH, a German mathematician, born 1777. In 1801 he published his Disquisitiones Arithmeticæ, treating of indeterminate analysis or transcendental arithmetic, and containing, in addition to many new theorems, a demonstration of the theorem of Fermat concerning triangular numbers. He also calculated, by a new method, the orbit of the planets Ceres and

Pallas. In 1807 he became professor of mathematics and director of the observatory at Göttingen, a position which he held till his death in 1855. He was pronounced by Laplace to be the greatest mathematician in Europe. His chief works were the Theoria Motus Corporum Cœlestium (1809), Intensitas Vis Magneticæ Terrestris (1833), Dioptrische Untersuchungen (1841), and Untersuchungen über Gegenstande der höheren Geodesie (1844).

Gaut. See *Ghâts.*

Gau'tama, a name of Buddha, the founder of Buddhism. See *Buddha.*

Gautier (gō-ti-ā), THÉOPHILE, French poet and critic, born 1811 at Tarbes (Hautes-Pyrénées). He studied painting under Rioult for two years, but gave up the brush for the pen, threw himself vigorously into the Romanticist movement, published a volume of poems in 1830, and for several years worked at general literary criticism. In 1832 appeared his poem Albertus; but his first great success was the romance Mademoiselle de Maupin, which led to his engagement by Balzac as secretary. He was afterwards engaged as theatrical and art critic on the Revue de Paris, the Artiste, the Moniteur, and the Journal Officiel. Owing to his connection with the Journal Officiel his fortunes became linked in some measure with those of the Bonaparte family, and he was appointed librarian to the Princess Mathilde. In 1872 he was sent by the republican government on a literary mission to Italy, and died in the same year. Among the most interesting of his productions may be ranked his Voyages en Espagne (1843), his Italia (1852), Caprices et Zigzags (1845), and Constantinople (1854), narratives of his travels; his Roman de la Momie (1856), Le Capitaine Fracasse (1863), Belle Jenny (1865), Spirite (1866), novels, together with the brilliant short stories, Fortunio, Une Nuit de Cléopâtre, Jean et Jeanette, Le Roi Candaule, &c.; and his Histoire de l'Art Dramatique en France depuis Vingt-cinq Ans (1849), Les Beaux Arts en Europe (1852), &c.

Gauze, a thin transparent stuff of silk, linen, or cotton. It is either plain or figured, the latter being sometimes worked with flowers of silver or gold.

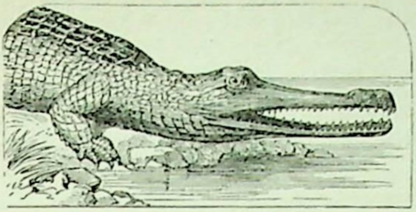
Gavar'ni, the assumed name of SULPICE PAUL CHEVALIER, French caricaturist, born at Paris in 1801. Originally a mechanical draughtsman, he began his artistic career in 1835 by designing costumes for theatres and journals of fashion. He then established Les Gens du Monde; but the journal was a failure, and the artist spent some time in the debtor's prison of Clichy. On his release he was employed upon the Charivari, the success of which was due in great part to his genius. His best known works are Les Enfants Terribles, Les Rêves, Les Fourberies de Femmes, and Impressions de Menages. In 1847 he visited England, and the sketches which he sent from St. Giles, London, to L'Illustration created an immense sensation. He afterwards illustrated Eugene Sue's Wandering Jew, Balzac's novels, and other works. He died in 1866.

Gavazzi (gä-vät'sē), ALESSANDRO, popular Italian preacher and religious reformer, born at Bologna 1809, died at Rome 1889. At the age of fifteen he became a monk of the Barnabite order, at twenty he was professor of rhetoric in the College of Naples, and soon after made his mark as a pulpit orator. In 1846 he was chaplain-general of the Roman patriotic league. Subsequently he threw off his papal allegiance and joined the agitation which ended in the short-lived republic. The French occupation of Rome drove him into exile, when he travelled through Britain and America lecturing against the Church of Rome, his power as an orator evoking much enthusiasm. He was with Garibaldi in 1860, and made subsequent visits to Britain gathering funds for the Free Italian Church, in the interests of which he lectured, preached, and travelled on deputation work till his death.

Gavelkind, an old English tenure, by which the land of the father was at his death equally divided among his sons, or in default of sons, among the daughters. The issue of a deceased son inherited the father's part. Collaterally, also, when one brother died without issue all the other brothers inherited from him. Gavelkind, before the Norman Conquest, was the general custom of the realm; it was then superseded by the feudal law of primogeniture, and only retained in Wales and Kent. The custom continued in Wales till the time of Henry VIII.; in Kent all land is still held in gavelkind unless specially disgavelled by act of parliament.

Ga'vial (*Gaviālis gangeticus*), the Indian crocodile, characterized by the narrow, almost cylindrical jaws which form an exceedingly elongated muzzle. The teeth (about 120 in number) are of equal length, and the feet are completely webbed. The males can

be distinguished from the females by the shape of the muzzle, which is much smaller at the extremity. The only extant species



Head of Gavial or Gangetic Crocodile (*Gaviālis gangeticus*).

occurs in South and Eastern Asia, especially in the Ganges. It feeds on fishes and small prey.

Gavotte′, an air for a dance with two strains, each of four or eight bars, in 2/4 or 4/4 time, the starting notes occupying half a bar. Like the minuet, it has been introduced for free treatment into suites, sonatas, &c. The name is said to be derived from the Gavots, the inhabitants of the Gap, in France.

Gay, JOHN, English poet, born near Barnstaple in 1688, and apprenticed to a silk mercer in London. In 1712 he became secretary to Anne, Duchess of Monmouth. In 1713 he published his Rural Sports, which he dedicated to Pope, with whom he formed a close friendship. In 1714 his caricature of Ambrose Philips' pastoral poetry was published, under the title of the Shepherd's Week, and dedicated to Lord Bolingbroke, by whose interest he was appointed secretary to the Earl of Clarendon, in his embassy to the court of Hanover. His mock-heroic poem, Trivia, or the Art of Walking the Streets of London, appeared in 1715, and in that year also was acted his burlesque drama of What d'ye Call It? but his next piece, the farce Three Hours after Marriage, altogether failed. In 1720 he published his poems by subscription, in 1724 his tragedy, The Captives, and in 1727 his well-known Fables. His Beggar's Opera, the notion of which seems to have been afforded by Swift, was first acted in 1728, at Lincoln's Inn Fields, where it ran for sixty-three nights, but the lord-chamberlain refused to license for performance a second part entitled Polly. He also wrote the pastoral Acis and Galatea and the opera Achilles. He died in 1732. The closing years of his life were mostly spent in the house of the Duke of Queensberry.

Gay, MARIE-FRANÇOISE-SOPHIE, French authoress, born at Paris 1776; maiden name, Nichault de Lavalette. She was first married to a financier, M. Liottier, from whom after six years she was divorced to marry M. Gay, a receiver-general under the empire. Her salon was a famous resort for the men of letters and artists of the time. She died at Paris in 1852. Her chief works are Laure d'Estell (1802), Anatole (1815), Le Moqueur Amoureuse (1830), Scènes de Jeunes Âges (1833), La Duchesse de Châteauroux (1834), Les Salons Célèbres (1837), and Le Mari Confident (1849). For her daughter, DELPHINE GAY, see *Girardin (Madame de)*.

Gayá, the chief town of a district of the same name in Bengal, on the right bank of the Phalgu, a tributary of the Ganges, 260 miles N.W. of Calcutta. It consists of an old and a new town. The former occupies a rocky height, is inhabited chiefly by Brahmans, and being regarded as a place of great sanctity, is annually visited by vast crowds of pilgrims. The latter, called Sahibganj, is the trading quarter, and the seat of administration where the European residents dwell. The place abounds with objects of Hindu worship, and almost every height in the vicinity is the subject of a legend. Pop. 80,383. The district has an area of 4712 sq miles, and pop. 2,138,331.

Gayal′, GYAL, a species of ox (*Bos frontālis*) found wild in the mountains of Northern Burmah and Assam, and long domesticated in these countries and in the eastern parts of Bengal. The head is very broad and flat in the upper part, and contracts suddenly towards the nose; the horns are short and slightly curved. The animal has no proper hump, but on the shoulders and fore part of the back there is a sharp ridge. The colour is chiefly a dark brown. Its milk is exceedingly rich, though not abundant.

Gay-Lussac (gä-lüs-äk), LOUIS JOSEPH, French chemist and physicist, born at St. Léonard (Haute-Vienne) 1778, died at Paris 1850. He was educated in the École Polytechnique from 1797 to 1800, and afterwards in the École des Ponts et Chaussées, but preferring chemistry, he entered Berthollet's École Laboratory. In 1802 he returned to the Polytechnique as demonstrator of chemistry, and in 1804 performed his two balloon ascents for scientific purposes, the first with Biot, the second by himself, an account of which appeared in the Journal de Physique.

In 1806 he was elected to the Academy of Sciences. In 1808 he was appointed professor of physics at the Sorbonne, a post he held for twenty-four years, in 1809 professor of chemistry in the École Polytechnique, and then succeeded Fourcroy as professor of general chemistry in the Jardin des Plantes. In 1831 he entered the chamber of deputies, and in 1839 he was made a peer of France, but he never took an active part in politics. He was especially celebrated for his researches into the chemical and physical properties of gases and vapours. For many years he edited, in conjunction with Arago, the Annales de Chimie et de Physique; and many of his numerous memoirs were published in this or in the Comptes Rendus. He also published, along with Thénard, Recherches Physico-chimiques, in which some of their most important discoveries are described. Other works are his Cours de Physique and Leçons de Chimie.

Gaza, an ancient town of Syria, originally a city of the Philistines, near the Mediterranean, 50 miles s.s.w. of Jerusalem. The modern town, Ghuzzeh, is a principal entrepôt for the caravans passing between Egypt and Syria. Pop. about 15,000.

Gaza, THEODORE, Renaissance scholar, born at Thessalonica about 1405, died in Calabria 1478. He came to Italy about 1430; became teacher of Greek at Ferrara; was patronized by Pope Nicholas V., Cardinal Bessarion, and King Alfonso of Naples. Gaza laboured for the diffusion of Greek literature, not only by teaching, but also by his writings, and especially by Latin translations of the Greek classics. His chief work is a translation of the writings of Aristotle on natural history.

Gazelle′ (*Gazella dorcas*), the type of a sub-family of antelopes (Gazellinæ), which includes some 23 species of small, mostly desert-loving forms. Its colour is a light fawn upon the back, deepening into dark-brown in a wide band which edges the flanks and forms a line of demarcation between the colour of the upper portions of the body and the pure white of the abdomen. The eye of the gazelle is large, soft, and lustrous. Both sexes are provided with horns, round, black, and lyrated, about 13 inches long. It seems to be confined to the north side of the Atlas Mountains, Egypt, Abyssinia, Syria, Arabia, and South Persia.


Gazelles (*Gazella dorcas*).

Gazette′ (from *gazzetta*, a small Venetian coin, which was the price of the first newspaper), a newspaper, especially an official newspaper. The first gazette in England was published at Oxford in 1665. On the removal of the court to London the title of *London Gazette* was adopted. It is now the official newspaper, and published on Tuesdays and Fridays. It is the organ by means of which all state intelligence, proclamations, appointments, &c., are promulgated, and in which declarations of insolvency are published. A similar official newspaper is published also in Edinburgh and Dublin.

Gazetteer′, a geographical dictionary; a book containing descriptions of natural and political divisions, countries, cities, towns, rivers, mountains, &c., alphabetically arranged. Among the more important general works of this kind are M'Culloch's Geographical Dictionary, Longmans' Gazetteer of the World, Blackie's Imperial Gazetteer, Lippincott's Pronouncing Gazetteer (based upon Blackie's), Saint-Martin's Nouveau Dictionnaire de Géographie Universelle, and Ritter's Geographisch-Statistisches Lexikon. There are also various gazetteers confined to particular countries.

Gaz′ogene, an apparatus used for manufacturing aerated water on a small scale for domestic use, by the combination of an alkali and an acid, as carbonate of soda and tartaric acid, which yield carbonic acid when mixed with water. It generally consists of two globes, one above the other, connected by a tube, the lower for containing water, and the upper the ingredients for producing the gas. The vessel is made air-tight by means of a screw-top, and when water is gently introduced into the upper globe from the lower, by inclining the vessel so as to fill about a half of the former, chemical action takes place, and the carbonic acid evolved gradually saturates the water in the lower globe. When this has taken place, the aerated water can be drawn off by opening a stop-cock at the top attached to a second tube which reaches almost to the bottom of the lower globe.

Gean (gēn), a kind of wild cherry-tree (*Prunus Avium*), common in Britain. The

fruit is smaller than that of the common cherry, of a red colour when unripe, and a deep purple or black when it arrives at maturity. The flavour is superior to that of most cherries. The wood is used for furniture and other purposes.

Gearing, in machinery, the parts collectively by which motion communicated to one portion of a machine is transmitted to another, generally a train of toothed wheels. There are two chief sorts of wheel gearing, viz. *spur-gearing* and *bevelled gearing*. In the former the teeth are arranged round either the concave or convex surface of a cylindrical wheel in the direction of radii from the centre of the wheel, and are of equal depth throughout. In *bevelled gearing* the teeth are placed upon a bevelled surface round a wheel which if the slope of the bevel were continued would form a cone, the teeth sloping similarly.

Gebang Palm, the *Corypha gebanga*, a fan-leaved palm of S.E. Asia. Its pith furnishes a sort of sago; its leaves are used for thatch, and made into hats, baskets, and bags; the fibres of its leaf-stalks are made into ropes, nets, cloth, &c., and the root is highly medicinal.

Geber (gē'bėr), Arabian chemist or alchemist, often designated the father of chemistry, flourished during the 8th century. He was acquainted with nearly all the chemical processes in use down to the 18th century. His writings describe various kinds of furnaces and other apparatus, and cupellation, distillation, and other chemical processes; the purification, composition, and properties of the metals then known—gold, silver, copper, lead, tin, and iron, and the functions of mercury, sulphur, and arsenic. He is the reputed author of an immense number of works, as well on metaphysics, language, astronomy, &c., as on chemistry.

Gebweiler (geb-vi'lėr), a town of Germany, in Alsace, on the Lauch. It has two fine R. Catholic churches, and works for cotton-spinning and weaving, woollen manufactures, bleaching, dyeing, calico-printing, machinery, &c. Pop. 12,395.

Gecko, a name common to the members of a family of nocturnal lizards (*Geckotidæ*), characterized by the general flatness of their form, especially of the head, which is somewhat of a triangular shape; the body is covered on the upper part with numerous round prominences or warts; the feet are rather short, and the toes of nearly equal length and furnished with flattened sucking pads by means of which the animals can run up a perpendicular wall, or even across a ceiling. The greatest number feed on insects and their larvæ and pupæ. Several of the species infest houses, where, although they are perfectly innocuous, their appearance makes them unwelcome tenants. One species is common in N. Africa and S. Europe.

Ged (ged), WILLIAM, inventor of stereotyping, born in Edinburgh about the beginning of the 18th century, died in poor circumstances in 1749. He first practised his great improvement in the art of printing in 1725; and some years later he entered into a partnership in London, the result of which was the production of two prayer-books only. He returned to Scotland in 1733, and published a stereotype edition of Sallust.

Geddes (ged'es), ALEXANDER, a Roman Catholic divine, poet, and miscellaneous writer, was born in the county of Banff, Scotland, in 1737, died in London 1802. At the age of twenty-one he was sent to the Scottish college at Paris, and, returning to Scotland in 1769, he took charge of a Roman Catholic congregation at Auchinhalrig in Banffshire, where he became known for his scholarship. In 1779 the University of Aberdeen granted him the degree of LL.D., and the next year he repaired to London with a view of obtaining facilities for his scheme of a new English translation of the Old and New Testaments. Two volumes of his translation and a volume of critical remarks were published, but the rationalistic views promulgated met with much censure, and his own immediate superiors suspended him. He was in the midst of a translation of the Psalms when he died. His other works include numerous pamphlets, translations, macaronic poems, &c.

Geddes, JENNY, the name tradition gives to a street fruit-seller, who, during the tumult in St. Giles' Church, Edinburgh, in July 1637, when the dean attempted to introduce the Episcopalian service-book, threw her stool at his head exclaiming, 'Villain! dost thou say mass at my lug?' This tumult led to events which annulled Episcopacy and restored Presbyterianism. The honour of the exploit has been claimed for a Barbara Hamilton, wife of John Mein, merchant in Edinburgh, but Jenny Geddes, the street fruit-seller's claim, has always been the popular one, and recently a memorial brass was placed in St. Giles to her memory.

Geefs (gäfs), GUILLAUME, Belgian sculptor, born at Antwerp 1806, died 1883. Among his most important works are the monument to the Victims of the Revolution of 1830 at Brussels; a statue of Rubens in front of Antwerp Cathedral; statues of King Leopold, &c. His brothers JOSEPH (died 1860) and ALOYS (died 1841) were also sculptors of reputation.

Geel (gāl). See *Gheel.*

Geelong (jē-long'), an Australian seaport town, colony of Victoria, near the head of the west arm of Port Philip Bay, 45 miles south-west of Melbourne. The town is well laid out on ground sloping to the bay, and its streets abound with fine shops, business premises, and public buildings. There is an extensive and well-laid-out botanical garden and several public parks belonging to the town. There are three jetties in the bay, alongside of which ships of the largest tonnage can load and discharge. There are wool-mills, tanneries, rope-works, &c., and a considerable trade is done in wool. The country surrounding Geelong is essentially agricultural, and is taken up by farms and orchards. Pop., inclusive of suburbs, 22,726.

Geestemünde (gās'tė-mün-dė), a seaport town of North Prussia, in Hanover, at the mouth of the Weser, separated from Bremerhaven by the Geeste. Extensive docks were constructed here in 1857–63. The port is strongly fortified, and the trade is increasing rapidly. The industries include ship-building, iron-founding, engineering, &c. Since 1889 Geestemünde has included the adjoining GEESTENDORF; total pop. 15,452.

Geez (gēz), the name of an Ethiopian language. See *Ethiopia.*

Gefle (yef'le), a seaport, Sweden, near the mouth of a river of same name in the Gulf of Bothnia, 50 miles N. of Upsala. It stands on both sides of the river and two islands formed by it, and has an excellent harbour. It has manufactures of linen, leather, tobacco, sail-cloth, &c.; ship-building yards; and an extensive trade in deals, tar, pitch, iron, &c. Pop. 20,753.

Gehen'na, a term used in the New Testament as equivalent to place of fire or torment, and rendered in the authorized (and the revised) version by *hell* and *hell-fire.* It is a form of the Hebrew *Ge-hinnom*, the valley of Hinnom, in which was Tophet, where the Israelites sometimes sacrificed their children to Moloch (2 Kings xxiii. 10). On this account the place was afterwards regarded as a place of abomination, and became the receptacle for the refuse of the city, perpetual fires being kept up in order to prevent pestilential effluvia.

Geibel (gī'bl), EMANUEL, German poet, born at Lübeck 1815, died 1884. He studied at the universities of Bonn and Berlin, and resided a year or two in Greece. He published his first collection of poems in 1840, which reached its hundredth edition in 1884. In 1843 he published a tragedy, King Roderick; in 1846 the epic König Sigurd's Brautfahrt. A second collection of his poems appeared in 1848—Juniuslieder (June-songs). A third collection of poems was published by him in 1857, a fourth in 1864. From 1851 to 1869 he was honorary professor of æsthetics and poetry in the University of Munich, but spent his latter days in his native town. He wrote also Brunhild, a tragedy; The Loreley, an opera in rhyme; and several other plays, but his fame rests on his lyrics, which are immensely popular.

Geikie (gē'ki), SIR ARCHIBALD, geologist, born at Edin. 1835. He was appointed to the geological survey in 1855; became director of the Scottish survey in 1867, and director-general to the United Kingdom survey, and head of the Museum of Practical Geology, London, in 1881. From 1870 to 1881 he was professor of geology and mineralogy in Edinburgh University, and he is the author of numerous manuals, &c., on geology.

Geikie, JAMES, LL.D., geologist, brother of Archibald Geikie, born at Edinburgh 1839. He was engaged on the Scottish survey from 1861 until he succeeded his brother in the geological professorship at Edinburgh in 1882. He is the author of The Great Ice Age, Prehistoric Europe, Outlines of Geology, &c.

Geissler's Tubes (gīs'lėr), from the manufacturer's name, a philosophical instrument maker of Bonn, tubes made of very hard glass, and containing highly rarefied gases. Each end of the tube has a platinum wire sealed into it to serve as electrodes. When a discharge of electricity is caused to take place in these tubes by connecting the electrodes to the terminals of a Ruhmkorff's coil or a Holtz's machine, very brilliant effects may be produced.

Gela (jē'la), one of the most important ancient Greek cities of Sicily, situated on the south coast of the island between Agrigentum and Camarina; founded in 690 B.C. by a colony of Cretans and Rhodians. The colony was remarkably prosperous, and in 582 B.C. sent out a portion of its inhabitants, who founded

Agrigentum. In 280 Phintias, the tyrant of Agrigentum, utterly destroyed Gela. Its site has been the subject of much controversy.

Gelada (gel'a-da), a singular Abyssinian baboon, remarkable for the heavy mane which hangs over the shoulders, and which only grows when the animal is adult. It is called *Gelada Ruppelii*, in honour of Dr. Ruppell, its discoverer.

Gelasius (je-), the name of two popes—GELASIUS I. and II. The former, who held the see from 492–496, founding on the alleged primacy of Peter, was one of the first who openly maintained that the Roman bishop alone was entitled to regulate matters of faith and discipline, though in practice he had not then attained any such superiority. GELASIUS II., pope for only one year (1118–19), and originally called John of Gaeta, was elected by the party hostile to Henry V., but was obliged to give way to Gregory VIII., supported by the emperor, and shortly after died in the monastery of Clugny.

Gelatine (jel'a tin), a concrete animal substance, transparent, and soluble slowly in cold water, but rapidly in warm water. It is confined to the solid parts of the body, such as tendons, ligaments, cartilages, and bones, and exists nearly pure in the skin, but it is not contained in any healthy animal fluid. Its leading character is the formation of a tremulous jelly when its solution in boiling water cools. Gelatine does not exist as such in the animal tissues, but is formed by the action of boiling water. The coarser forms of gelatine from hoofs, hides, &c., are called *glue;* that from skin and finer membranes is called *size;* and the purest gelatine, from the air-bladders and other membranes of fish, is called *isinglass.* With tannin a yellowish white precipitate is thrown down from a solution of gelatine, which forms an elastic adhesive mass, not unlike vegetable gluten, and is a compound of tannin and gelatine. It is this action of tannin on gelatine that is the foundation of the art of tanning leather. Gelatine when acted upon by sulphuric acid yields gelatine sugar or glycocoll. When treated with potash it is said to yield glycocoll and leucine. Gelatine is nearly related to the proteids. No chemical formula has yet been deduced for it. It is a nutritious article of food, and as part of the diet in hospitals produces the best effects; but animals fed exclusively on it die with the symptoms of starvation, as it cannot yield albumen, fibrine, or caseine. Its ultimate components are 47·8 carbon, 7·9 hydrogen, 16·9 nitrogen, 27·4 oxygen.

Gelderland, GUELDERLAND (gel'), a province of the Netherlands; area, 1963 English sq. miles. It is generally flat, and has much alluvial soil, well fitted both for arable and grass husbandry. The manufactures, principally woollen, cotton, and linen goods, soap, salt, and glass, are carried on extensively in various quarters. The principal towns are Arnheim, Nijmegen, Thiel, and Zutphen. Pop. 496,538.

Geldern (gel'dérn), a town of Rhenish Prussia, 27 miles north-west of Düsseldorf. Pop. 5691.

Gelder-rose. See *Guelder-rose.*

Gelée (zhė-lā), CLAUDE. See *Claude Lorraine.*

Gell (jel), SIR WILLIAM, English antiquarian and classical scholar, born 1777, died Naples 1836. He was educated at Cambridge, and was for some time a fellow of Emanuel College in that university. In 1814 the Princess of Wales (afterwards Queen Caroline) appointed him one of her chamberlains, and he accompanied her on her travels for several years. His principal works are: The Topography of Troy, The Geography and Antiquities of Ithaca, The Itinerary of Greece, The Itinerary of the Morea, The Topography of Rome, and the interesting and beautiful work, Pompeiana, or Observations upon the Topography, Edifices, and Ornaments of Pompeii.

Gellert (gel'ért), CHRISTIAN FÜRCHTEGOTT, German poet, born 1715, died 1769. He was appointed extraordinary professor of philosophy at Leipzig in 1751, where his lectures were received with great applause. His hymns, tales, fables, and essays enjoyed much popularity in their day.

Gellius (jel'), AULUS, a Roman author of the 2d century. His Noctes Atticæ, a book of selected passages from many ancient authors, is now of great value, as the authors from which he drew his materials are in a great measure lost.

Gelnhausen (geln'hou-zn), an old walled town of Prussia, prov. Hesse-Nassau, 16 miles E.N.E. of Hanau, on the Kinzig. Its principal buildings are a large Gothic church of the 13th century, and, on an island in the Kinzig, a recently-restored palace in which Frederick Barbarossa and several of his successors used to reside. Pop. 3695.

Gelon (jē'lon), an ancient Greek ruler, tyrant of Gela, and afterwards of Syracuse. After the death of Hippocrates, tyrant of

Gela, he seized the sovereign power (B.C. 491), and about 485 B.C. gained possession of Syracuse. From this time he bent all his energies to the aggrandizement of his new capital, the power and importance of which he greatly increased by his conquests and good government. His aid was sought by the Greeks against Xerxes, but a formidable invasion of Carthaginians under Hamilcar engaged him in Sicily. The result was the total defeat of the Carthaginians in the great battle of Himera (B.C. 480). It is celebrated in an ode by Pindar. Gelon died in 478 B.C., and was succeeded by his brother Hieron.

Gelse'mium, a genus of plants belonging to the nat. order Loganiaceæ, the best-known, *G. nitidum* or Carolina jasmine, being an evergreen climbing shrub of the Southern States of America, with twigs producing a milky juice, opposite lance-shaped shining leaves, and sweet-scented yellow flowers. The root has valuable medicinal properties, being used for controlling certain forms of nervous irritability.

Gemara (ge-mä'ra), in Jewish literature, the second part of the Talmud or commentary on the Mishna. See *Talmud*.

Gembloux (zäṇ-blö), an old Belgian town, prov. of Namur, 24 miles S.E. of Brussels. It has a Benedictine abbey of the 9th century, now used as a royal agricultural institution. Pop. 3642.

Gemini (jem'i-nī), the Twins (II), the third sign of the zodiac, so named from its two brightest stars, Castor, of the first magnitude, farthest to the west, and Pollux, of the second, farthest to the east. Its constituent stars form a binary system revolving in about 250 years. The sun is in Gemini from about the 21st May till about the 21st June, or the longest day.

Gemmation, in zool. a mode of reproduction among certain animals of low type, which consists in the production of a bud or buds, generally from the exterior, but sometimes from the interior, of the body of the animal, which buds are developed into independent beings that may or may not remain attached to the parent organism. This mode of reproduction is seen in the sea-mats, the fresh-water polyp, &c.

Gems, or precious stones, are sometimes found crystallized in regular shapes and with a natural polish, more commonly of irregular shapes and with a rough coat. The term gem often denotes more particularly a stone that is cut, polished, or engraved, and it also includes pearls and various artificial productions. The first and most valuable class of gems includes diamonds, emeralds, rubies, sapphires, and a few others; the second class includes the amethyst, topaz, garnet, &c.; while agate, lapis-lazuli, cornelian, &c., though much used for ornament, can scarcely be called gems. The various precious stones are described under their proper heads. The fabrication of artificial gems is now prosecuted with skill and capital, and has become an important industrial art. The base of one class of imitations is a peculiar kind of glass of considerable hardness, brilliancy and refractive power called *paste* or *strass*, which is distinguished from ordinary glass by the presence of 50 per cent of oxide of lead among its constituents. When the strass is obtained very pure it is melted and mixed with substances having a metallic base, generally oxides, which communicate to the mass the most varied colours. Another class, called semi-stones or doublets, are made by affixing thin slices of real gem to an under part of strass by means of an invisible cement. In some cases an imitation is made by setting uncoloured strass or quartz in jewelry with some coloured 'foil' at the back of it. Attempts have within recent years been made with a fair measure of success to manufacture true gems by artificial processes. The French chemists Becquerel, Ebelman, Gaudin, Despretz, and others have done much in this direction. In 1858 MM. Deville and Caron communicated to the Academy of Sciences, Paris, a process for the production of a number of gems of the corundum class, as rubies, sapphires, &c. The process essentially consisted in exposing the fluoride of aluminium, together with a little charcoal and boracic acid, in a plumbago crucible protected from the action of the air, to a white heat for about an hour. Many experiments with a view to producing diamonds artificially have also been made. From hydrocarbons, subjected to a very intense heat and enormous pressure, minute fragments of crystalline carbon, differing from natural diamond in no respect save brilliancy, have been produced. In art and archæology the term gem is usually applied to a precious stone cut or engraved in ornamental designs, or with inscriptions. Stones on which the design is raised above the general surface are called *cameos;* those having the design sunk below the surface are called *intaglios.* Early specimens of cut gems are seen in the scarabæi or beetle-shaped sig-

nets worn in rings by the ancient Egyptians. Among the Greeks, Etruscans, and Romans gem-sculpture held a high place, reaching its highest point under Augustus. Modern gem-engraving dates from the beginning of the 15th century, the chief seats of the art being Italy and Germany. Rome is now the headquarters of the seal-engraving art. The tools of the engraver consist of a lathe, and a series of little rods with heads of different shapes, all of which can be adjusted to the lathe. The axis of the lathe is pierced at the centre with an orifice, into which the tools for cutting the stone are firmly fixed by means of a screw. The engraver wets the extremity of the mounted rod with diamond dust made into a paste with olive-oil, and as the wheel is in motion he applies the stone, firmly cemented to a piece of reed, to the revolving tool. The diamond dust enables the tool to cut into the stone with ease. As the design is frequently very elaborate and of the greatest delicacy, the tools are necessarily multiform. The stones used for cameo-cutting often exhibit layers of different colours, so that the raised design has a tint distinct from the ground. Intaglios are very often executed in transparent stones, and the subjects treated in this manner are more limited in number. They are chiefly such as seals, devices, coats of arms, &c.

Gemsbok (gemz'bok), the *Oryx gazella*, a large powerful member of the antelope family, inhabiting the plains of South Africa. It equals the domestic ass in size, has a short erect mane, a long sweeping black tail, and long sharp-pointed heavy horns, nearly straight from base to tip, and obscurely ringed throughout the lower half. By the aid of these natural bayonets it can easily defend itself from the smaller Carnivora, and it has been known to drive off, and even kill, the lion himself.

Gendarmes (zhäṇ'därm), the name originally given in France to the whole body of armed men, but after the introduction of standing armies to a body of heavy-armed cavalry, which composed the chief strength of the forces. Gendarmes are now the French armed police. They are all picked men; they are usually taken from the regular forces, and are of tried courage or approved conduct. There are *horse gendarmes* and *foot gendarmes*. They are formed into small parties called *brigades;* and the union of a number of these forms a *departmental company*.

Gender, in gram. one of those classes or categories into which words are divided according to the sex, natural or metaphorical, of the beings or things they denote. It may be exhibited by a class of words marked by similarity in termination, the termination having attached to it a distinction in sex, as seen in nouns, adjectives, participles, &c. There are three genders in all: *masculine*, *feminine*, and *neuter*, but these three distinctions only exist in some languages. In Sanskrit, Greek, and Latin all three are present, as also in German and English. English words expressing males are said to be of the *masculine* gender; those expressing females, of the *feminine* gender; and words expressing things having no sex are of the *neuter*, or *neither* gender. Gender is thus coincident with sex in English, and is a very simple matter. But in other languages sex and gender have little or no necessary relation, the majority of the names applied to inanimate objects being either masculine or feminine, and the grounds for such distinction being quite obscure. In the languages derived from the Latin—Italian, French, Spanish, and Portuguese—a neuter gender is not recognized. In the highly inflected languages there are certain terminations distinctive of the different genders, but in English gender only to a slight extent depends on the form of the word—*ess*, for instance, is a feminine termination. In English the gender of a noun only affects the pronoun substituted for it.

Geneal'ogy, the systematical investigation and exhibition of the origin, descent, and relations of families (or their *pedigree*). Persons descended from a common father constitute a family. Under the idea of *degree* of relationship is denoted the nearness or remoteness of relationship in which one person stands with respect to another. A series of several persons, descended from a common progenitor, is called a *line*. A line is either *direct* or *collateral*. The collateral lines comprehend the several lines which unite in a common progenitor. For illustrating descent and relationship genealogical tables are constructed, the order of which depends on the end in view. The common form of genealogical tables places the common stock at the head, and shows the degree of each descendant by lines. Some tables, however, have been constructed in the form of a tree, in which the progenitor (German, *Stammvater*) is placed beneath, as if for a root.

General, the commander of an army, or of a division or brigade; the highest military

title, with the exception of that of field-marshal. In the British service there are three ranks, the highest *general*, the second *lieutenant-general*, and the lowest *major-general*, the last being immediately above a colonel, as in other services. *Brigadier-general* is not a distinctive rank in Britain as it is in the U. States.—*General*, in the Roman Catholic Church, is the title given to the supreme head, under the pope, of a monastic order. In most of the orders he is elected for three years, or some other fixed term, by the Jesuits for life, but the election must be confirmed by the pope.

General Assembly. See *Assembly (General)*.

Generalization, in logic, is the act of comprehending, under a common name, several objects agreeing in some point which we abstract from each of them, and which that common term serves to indicate.

General Lien, in law, the right to retain possession of a chattel until payment be made, not only of any debt due in respect of that particular chattel, but of any balance that may be due on general account in the same line of business. General liens do not exist at common law, but depend entirely upon contract express or implied from the special usage of dealing between the parties.

General Officer, in the army, an officer higher in rank than a colonel. See *General*.

General Ship, in maritime law, is a ship announced by the owners to take goods from a particular port at a specified time, and which is not under special contract to particular individuals.

Generation, a single succession of human beings (or animals) who are born, grow up, and reproduce their kind; hence, an age or period of time between one succession and the next, as the third, the fourth, or the tenth generation. The length of a generation is usually estimated at about thirty years.

Generation. See *Reproduction*.

Generation, Alternate, or Metagenesis, that kind of multiplication, seen in some invertebrate animals or even in plants, in which parents produce progeny unlike, sometimes extremely unlike, themselves, while this unlike progeny give rise to others resembling the original forms. Sometimes there are more than one unlike form between these like forms. The Hydrozoa abundantly illustrate this phenomenon, also the Echinoderms, Polyzoa, Tunicata, the wheel animalcules, Nematoid worms, flat-worms, tape-worms, several of the true Annelids; among Crustaceans, Daphnia, the Phyllopods; among Insects, the plant-lice. The steps may be seen in certain of the Hydroid Polyps, thus: (1) There is an ovum or egg, free-swimming and impregnated. (2) This ovum attaches itself to a fixed submarine object, and develops into an organized animal. (3) This organism produces buds or zooids, often of two kinds—one set nutritive, the other generative—unlike each other and unlike their parent, the whole forming a hydroid colony. (4) The generative set mature eggs, which on being liberated become the free-swimming ova (No. 1), and the cycle is renewed. A somewhat similar phenomenon is that of *parthenogenesis* (which see).

Generation, Spontaneous, or Abiogenesis, the doctrine that living matter may originate spontaneously, 'that under certain circumstances dead matter may build itself up into living matter without the intervention of already existing protoplasm.' In the 17th century this was the dominant view, sanctioned alike by antiquity and authority, and was first assailed by Redi, an Italian philosopher. Buffon held the doctrine in a very modified degree. He held that life is the indefeasible property of certain indestructible molecules of matter which exist in all living things, and have inherent activities by which they are distinguished from not-living matter, each individual living organism being formed by their temporary combination. Of course it is only animals or plants of very low type and minute size that have been supposed thus to be produced spontaneously from dead matter; and the readiness with which such appear, in circumstances in which one might suppose no germs of them could be present, gives some countenance to the belief. Thus even at the present day authorities are found who still declare their adherence to the doctrine of spontaneous generation, but there is every reason to believe that, whatever may have been the case with the first beginnings of life, living matter is now invariably derived from pre-existent living matter.

Generic Name, in natural history, the denomination which comprehends all the species of a genus: thus *Canis* is the *generic* name of animals of the dog kind; *Felis*, of the cat kind; *Cervus*, of the deer kind. See *Genus*.

Genesee (jen-e-sē'), a river of the U.States, which rises in Pennsylvania, flows north through New York, and falls into Lake On-

tario 6 miles below Rochester, after a course of 145 miles. It is notable for its varied and romantic scenery, and its extraordinary falls. These falls are five in number; three of them occur about 90 miles from the mouth of the river, and are respectively 60, 90, and 110 feet high. The other two are near Rochester, and are both about 100 feet high.

Genesis (Greek, creation, birth, origin), the first book of the Bible and of the Pentateuch, named in the Hebrew canon *B'reshith* (in the beginning), from the term with which it commences. From the Greek translators it received the name it is now commonly known by. Genesis consists of two great but closely-connected divisions:—(1) The history of the creation, the fall of man, the flood, the dispersion of the human race, chap. i.–xi. (2) The history of the fathers of the Jewish race, chap. xii.–l. A certain apparent difference of style and language, the occurrence of what seem gaps on the one hand, and repetitions and contradictions on the other, and the different use of the term for the divine name (*Jehovah*, Everlasting; and *Elohim*, Almighty), led very early to the question of the integrity of the book, and various critics have assumed larger or smaller interpolations.

Genet (jen'et), a digitigrade carnivorous mammal of the family Viverridæ. The genus *Genetta* contains five species, the best known of which is the *G. vulgāris*, the common genet, whose range extends all around the Mediterranean, including Western Asia, Northern Africa, and Southern Europe. It is about the size of a small cat, but of a longer form, with a sharp-pointed snout, upright ears, and a long tail. It has a beautiful soft fur, and, like the civet, produces an agreeable perfume. The habits of the genet are like those of the weasel tribe; it is easily tamed, and is sometimes employed in Constantinople and elsewhere to catch rats and mice.

Geneva (je-nē'va; German, *Genf;* French, *Genève*), a town of Switzerland, capital of the canton of the same name, situated at the western extremity of the Lake of Geneva, where the Rhône issues, here crossed by several bridges, and dividing the town into two portions, the larger and more important of which is on the left or south bank. The environs are covered with handsome villas, and the town itself, when approached either by land or water, has a very attractive appearance. It was formerly surrounded by walls and regular fortifications, but since 1850 these have been removed. The town is divided into two parts, an upper and a lower. The upper town, occupied chiefly by the wealthier citizens, consists of well-built houses and handsome hotels; the lower town, the seat of trade and residence of the poorer classes, consists largely of houses remarkable for their height, and lining narrow, irregular, dark, and ill-cleaned streets, but great improvements have recently been carried out. The more important public buildings are the cathedral or church of St. Pierre, a Gothic structure of the 10th, 11th, and 12th centuries, occupying the highest site in the town, and by its three towers forming the most conspicuous object within it, somewhat defaced externally by a very incongruous Greek peristyle; the town-house in the Florentine style; the Musée Rath, containing a collection of pictures and other works of art; the university building, nearly opposite the botanic garden, rebuilt in 1867–71, and containing the public library, founded by Bonivard, the prisoner of Chillon, in 1551, and now numbering 90,000 vols.; and the museum of natural history. The only important manufactures of Geneva are that of watches, musical-boxes, and jewelry, for all of which the town is justly famed. Geneva has ample railway communication, and is one of the principal entrances for tourists and travellers into Switzerland. In literature and science Geneva has long occupied a distinguished place, and it has been the birthplace or the residence of many eminent men, including Calvin, Beza, Knox, Le Sage, Necker, De Candolle, Rousseau, Sismondi, &c. Geneva early adopted the principles of the Reformation, and chiefly through the teaching of Calvin the town acquired an important influence over the spiritual life of Europe, and became the centre of education for the Protestant youth of Britain, France, and Germany. Pop. 52,516.—The canton is bounded by the canton of Vaud and the Lake of Geneva, and by France. Area, 109 sq. miles. It belongs to the basin of the Rhône, and the only streams of importance are that river and the Arve, which joins it a little below the town of Geneva. The soil has been so much improved by skilful and persevering culture that abundant crops of all kinds suitable to the climate are raised, and the whole territory wears the appearance of a garden. Manufactures consist chiefly of clocks and watches, musical-boxes, mathematical instruments, gold, silver, and other metal

wares, woollen cloths, and silk goods of various descriptions, hats, leather, and articles in leather; and there are numerous cotton-mills, calico-printing works, and dye-works. The territory of Geneva having, by the arrangements of the Congress of Vienna, obtained an accession of fifteen communes, detached from France and Savoy, was admitted a member of the Swiss Confederation in 1814, and ranks as the twenty-second canton. Its constitution of 1848 is the most democratic in the federation. All religious denominations are declared to have perfect freedom, but two of them are paid by the state—the Roman Catholics, amounting to rather more than a third of the population, and the Protestant National Church. The language spoken is French. Pop. 101,595.

Geneva (from Fr. *genièvre*, L. *juniperus*, juniper), a spirit distilled from grain or malt, flavoured with juniper berries. The word is now usually in the form *gin*. Also called *Hollands*. See *Gin*.

Geneva, Lake of, or Lake Leman (Latin, *Lacus Lemanus*), the largest of the Swiss lakes, extending in the form of a crescent, with its horns pointing southward, between France on the south, and the cantons of Geneva, Vaud, and Valais: length, measured on its north shore, 55 miles, and on its south shore 40 miles; central breadth, about 6 miles; area, 331 sq. miles; greatest depth, 900 feet. It is 1150 feet above the sea. On the north the shore is low, and the ground behind ascends gradually in beautiful slopes. On the south, and particularly at the east end, the shore is rocky and abrupt, and lofty precipices often rise sheer from the water's edge. It contains various species of fish, and its water is remarkably pure and of a beautiful blue colour. The Rhône, which enters its eastern extremity a muddy turbid stream, issues from its western extremity perfectly pellucid, and likewise of the finest blue.

Geneva Arbitration. See *Alabama* (*The*).

Geneva Bible, a copy of the Bible in English, printed at Geneva; first in 1560. This copy was in common use in England till the version made by order of James I. was introduced, and it was laid aside by the Calvinists with reluctance.

Geneva Convention, an agreement concluded at an international conference held in Geneva in 1864, for the succour of the sick and wounded in time of actual warfare. The neutrality of hospitals, ambulances, and the persons attending on them was provided for; and the use of the red cross on a white ground as a sign of neutrality has received the adhesion of all civilized powers.

Geneviève (jen'e-vēv or zhėn-vi-āv), the name of two female saints.—1. St. Geneviève, the patron saint of Paris; born at Nanterre, about 5 miles from Paris, in the year 423; died at Paris about the beginning of the 6th century. She devoted herself while yet a child to the conventual life. Her prayers and fastings are credited with having saved Paris from the threatened destruction by Attila in 451. Many legends are told respecting her, and several churches have been dedicated to her. Her festival is held on the 3d January.—2. St. Geneviève, by birth Duchess of Brabant, wife of Siegfried, count palatine in the reign of Charles Martel (about 750). According to the legend, which is the subject of several tales and dramas, she was accused of adultery during her husband's absence and condemned to death; but was allowed to escape, and she lived six years in a cavern upon nothing but herbs. She was finally found, and carried home by her husband, who in the meantime had become convinced of her innocence.

Genghis Khan, or Jenghis Khan (jen'-gis), Mongol conqueror, born about 1160, died 1227. His father was chief over thirty or forty clans, but paid tribute to the Tartar Khan. He succeeded his father when only fourteen years of age, and made himself master of the neighbouring tribes. A great number of tribes now combined their forces against him. But he found a powerful protector in the great Khan of the Karaite Mongols, Oung, or Ung, who gave him his daughter in marriage. After much intestine warfare with various Tartar tribes Genghis was proclaimed Khan of the United Mongol and Tartar tribes. He now professed to have a divine call to conquer the world, and the idea so animated the spirit of his soldiers that they were easily led on to new wars. The country of the Uigurs, in the centre of Tartary, had long excited his ambition. This nation was easily subdued, and Genghis Khan was now master of the greatest part of Tartary. Soon after several Tartar tribes put themselves under his dominion, and in 1209 he passed the great wall of China. The conquest of China occupied the Mongols more than six years. The capital, then called *Yenking*, now *Peking*, was taken by storm in 1215 and plundered. The murder of the ambassadors whom Genghis Khan had sent to the King of Kharism (now Khiva) occasioned

the invasion of Turkestan in 1218 with an army of 700,000 men; and the two cities of Bokhara and Samarcand were stormed, pillaged, and burned. Seven years in succession was the conqueror busy in the work of destruction, pillage, and subjugation, and extended his ravages to the banks of the Dnieper. In 1225, though more than sixty years old, he marched in person at the head of his whole army against the King of Tangut (South-western China), who had given shelter to two of his enemies, and had refused to give them up. A great battle was fought, in which the King of Tangut was totally defeated with the loss of 300,000 men. The victor remained some time in his newly-subdued provinces, from which he also sent two of his sons to complete the conquest of Northern China. At his death his immense dominions were divided among his four sons.

Genii. See *Genius.*

Gen'ipap (*Genipapo*, the Guiana name), the fruit of a South American and West Indian tree, the *Genipa americana*, nat. order Rubiaceæ. It is about the size of an orange, and of a pleasant vinous flavour.

Genis'ta, a genus of leguminous plants, comprising about 100 species, one of which is the *Planta genista*, the *Plante genêt*, from which the Plantagenets took their name. The *Genista tinctoria*, or dyer's broom, so called, as it was formerly much employed by dyers, who obtained a good fixed yellow or orange colour from it, is frequent in England and the Lowlands of Scotland.

Genitive Case, in grammar, a case in the declension of nouns, adjectives, pronouns, participles, &c., expressing source, origin, possession, and the like. In English grammar the corresponding case is the possessive case.

Genius, a tutelary deity; the ruling and protecting power of men, places, or things; a good or evil spirit supposed to be attached to a person and influence his actions. The Genii of the Romans were the same as the *Daimŏnes* (Demons) of the Greeks. According to the belief of the Romans, which was common to almost all nations, every person had his own Genius; that is, a spiritual being, which introduced him into life, accompanied him during the course of it, and again conducted him out of the world at the close of his career. The Genii of women were called *Junones.* The Genii were wholly distinct from the *Manes*, *Lares*, and *Penates*, though they were allied in one important feature—the protection of mortals.

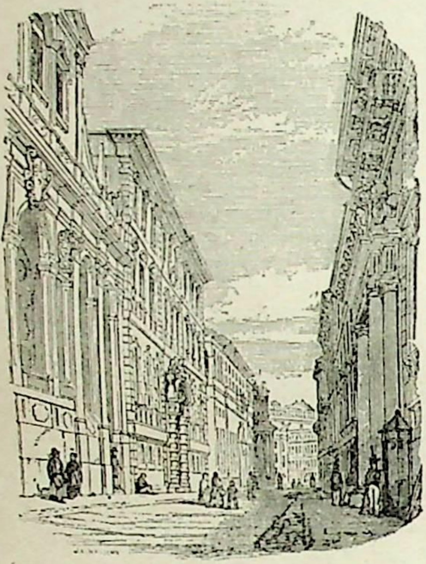
The term *genii* (with the singular *genie*) is also used as equivalent to the *jinn* (singular *jinnee*) of Arabic tales. These are supposed to be a class of intermediate beings between angels and men. See *Jinn.*

Genlis (zäṇ'lēs), Stéphanie Félicité Ducrest de St. Aubin, Countess de, French authoress, born near Autun 1746, died at Paris 1830. At four years of age she was admitted as a canoness into the noble chapter at Aix, and at seventeen married the Count de Genlis. By this marriage she became niece to Madame de Montesson (who had been privately married to the Duc d'Orléans), and obtained through her the place of lady-in-waiting to the Duchesse de Chartres. In 1782 the Duc de Chartres (Philippe Égalité) appointed her governess of his children. She obtained great influence over her employer, and was the object of no little scandal in her relations with him, which was strengthened by the mysterious appearance of an adopted daughter, afterwards known by the name of Pamela, who married Lord Edward Fitzgerald. At this time she published several works on education, &c. On the breaking out of the Revolution she retired for a while to Switzerland, and then to Altona. In 1800 she returned to France, gained the favour of Napoleon, who gave her a pension. From that time she resided constantly in Paris. Her works, which embrace a wide variety of subjects, amount altogether to about ninety volumes, and include some of the standard novels in the French language. Her voluminous Mémoires, written when she was upwards of eighty years of age, abound in scandal, and are full of malignant attacks upon her contemporaries.

Gennesaret, Sea of. See *Galilee (Sea of).*

Genoa (jen'o-a; Ital. *Genŏva*, '*La superba*'), a seaport of N. Italy, the chief commercial city of the kingdom, on the coast of the Mediterranean, at the head of the gulf of the same name, 75 miles S.E. of Turin. It is beautifully situated at the foot and on the slope of the Ligurian Alps, the lower hills of which form a background to the city. It is inclosed by extensive fortifications, and the heights around are crowned with detached forts. It has a most imposing effect when approached either by land or sea. In the older parts of the town the streets are extremely narrow, with lofty buildings

on either side. In the newer quarters many of them are spacious, and are lined with palaces and other noble edifices. Some of the palaces are filled with works of art by the greatest masters. The principal are—the Ducal palace (now containing the law-courts and various public offices), the Palazzo del Municipio or town-hall, the Palazzo Brignole or Rosso (with the largest picture-gallery in Genoa), the Palazzo Pallavicini, the Palazzo Reale, built in the 16th century



Strada Balbi, Genoa.

for the Durazzo family, was purchased in 1815 by the royal family, and the palaces of Doria, Serra, Cambasio, Balbi, and Durazzo. The most remarkable of the churches is the Duomo, or Cathedral of St. Lorenzo, founded in the 11th century, but not completed till the beginning of the 12th; S. Maria in Carignano, built in imitation of the original plan of St. Peter's at Rome; S. Stefano, a Gothic church, the oldest parts of which date from the end of the 12th century; S. Ambrogio, containing two paintings by Rubens, and the Assumption of Guido Reni. The principal charitable institution is the Albergo de' Poveri, in which 1600 individuals, orphans and old people, find shelter. Others are the Ospedale del Pammatone founded in 1430; and a hospital recently built by the Galliera family. Among the theatres of the city may be mentioned the Teatro Carlo Felice, an elegant structure, with a splendidly fitted up interior. Besides the university, founded in 1775, the chief educational institutions are the theological seminary, the school of fine arts, the royal marine school, and the navigation school. The building of the Bank of St. George, one of the most ancient banks of circulation and deposit in Europe, is now used as a custom-house. In one of the open spaces there is a fine marble statue of Columbus, with accompanying allegorical figures. The Campo Santo, or cemetery, about 2½ miles from the city, is one of the most beautiful burial-grounds in Europe. It contains fine mortuary buildings and much statuary in white marble. The manufactures of Genoa include cotton and silk goods, gold, silver, paper and leather goods, sugar, and preserved fruits. The old harbour, which is of a semicircular form and about ¾ mile in diameter, is formed by two moles projecting into the sea from opposite sides; there are now also two outer or additional harbours formed by moles recently constructed. The principal articles of export are cereals, oils, fruit, cheese, rags, the products of its manufactures, &c. Many emigrants embark here. Imports—cotton, wool, wheat, sugar, coffee, coal, hides, iron, &c. In 1894 the exports amounted to £5,744,606, and the imports to £15,332,578.—Under the Romans Genoa was famous as a seaport. After the breaking up of the empire of Charlemagne, it constituted itself a republic, presided over by doges. From 1119 it was almost constantly at war with Pisa down to 1284, when Genoa inflicted a crushing defeat on Pisa. The Genoese obtained the supremacy over Corsica, and nominally over Sardinia, possessed settlements in the Levant, on the shores of the Black Sea, on the Spanish and Barbary coasts, and had a very flourishing commerce. The rivalry between Genoa and Venice was a fruitful source of wars during the 12th–14th centuries. Meanwhile the city was internally convulsed by civil discord and party spirit. The hostility of the democrats and aristocrats, and the different parties among the latter, occasioned continual disorder. From the contests of noble rivals, in which the names of Doria, Spinola, Grimaldi, and Fieschi are prominent, Genoa was drawn into the Guelph and Ghibelline contest. In the absence of internal tranquillity the city sometimes submitted to a foreign yoke in order to get rid of anarchy.

In the midst of this confusion St. George's Bank was founded. It owed its origin to the loans furnished by the wealthy citizens to the state, and was conscientiously supported by the alternately dominant parties. In 1528 the disturbed state regained tranquillity and order, which lasted till the end of the 18th century. The form of government established was a strict aristocracy. The nobility were divided into two classes —the old and new. To the old belonged, besides the families of Grimaldi, Fieschi, Doria, Spinola, twenty-four others, who stood nearest them in age, wealth, and consequence. The new nobility comprised 437 families. By little and little Genoa lost all her foreign possessions. Corsica, the last of all, revolted in 1730, and was ceded in 1768 to France. After the battle of Marengo (1800) Genoa was taken possession of by the French. In 1805 it was formally annexed to the Empire of France, in 1815 to the Kingdom of Sardinia, with which it has become a portion of the Kingdom of Italy. Pop. (1894), 207,605.

Genoa, Gulf of, a large indentation of the Mediterranean, in North Italy, at the head of which lies the city and port of Genoa. No precise points can be named as marking its entrance; but it may, perhaps, be generally said to comprise the entire space north of lat. 43° 40′ N.

Genre-painting (zhän-r), that department of painting in which are depicted scenes of everyday life, in opposition, for instance, to historical painting, in which historic personages are exhibited, or to landscape.

Gens, in Roman history, a clan or stock embracing several families united together by a common name and certain religious rites; as, the Fabian *gens*, all having *Fabius* as part of their personal name; the Julian *gens*, all named Julius; the Cornelian *gens*, &c.

Gens D'Armes. See *Gendarmes*.

Genseric (jen′), a king of the Vandals, who, having obtained joint possession of the throne of Spain with his brother Gonderic, crossed the Straits of Gibraltar with 50,000 men, A.D. 429, on the invitation of Bonifacius, the Roman governor of Africa, to assist him against the Moors. He, however, soon declared his independence, and, having completely defeated Bonifacius, founded a kingdom, which, in 439, had its seat at Carthage. He collected a powerful fleet, ravaged the coasts of Sicily and Italy, and in 455 took and sacked Rome. Two unsuccessful attempts were made by the Eastern and Western emperors to overthrow his power, but Genseric secured all his conquests, and, notwithstanding all his cruelties, was permitted to die in peace A.D. 477.

Gentian, the name given to the members of the genus *Gentiāna* (order Gentianaceæ), a large genus of bitter herbaceous plants, having opposite, often strongly ribbed, leaves, and blue, yellow, or red, often showy flowers. The calyx consists of four or five valvate segments, and the corolla is four or five parted; the fruit is a two-valved, one-celled, many-seeded capsule. They are for the most part natives of hilly or mountainous districts in the northern hemisphere. The most important species is *Gentiāna lutĕa*, a native of Switzerland and the mountainous parts of Germany. The root has a yellowish brown colour and a very bitter taste, and is imported into Britain in considerable quantities, where it is used medicinally, and also as an ingredient of cattle foods. In Switzerland and Bavaria a liqueur called Enziangeist or 'gentian-spirit' is made from it. Many of the blue-flowered species, as *G. acaulis*, *G. nivālis*, and *G. verna*, are among the most conspicuous and ornamental of European alpine plants. Five species are British.



Yellow Gentian (*Gentiāna lutĕa*).

Gentiana′ceæ, the gentians, an order of monopetalous exogens, consisting mostly of annual or perennial herbaceous plants, with opposite often connate entire leaves, and yellow, red, blue, or white flowers, which are borne in dichotomous or trichotomous cymes or in globose terminal heads. All are characterized by their bitter principle. The order contains about 520 species, which are widely dispersed throughout the world, occurring most plentifully in temperate mountainous regions. Some very handsome species are tropical, while a few occur in Arctic latitudes.

Gentile, in Scripture, any one belonging to the non-Jewish nations and not a Christian; a heathen. The Hebrews included in the term *goim*, or nations, all the tribes of men who had not received the

true faith, and were not circumcised. The Christians translated *goim* by the L. *gentes*, nations, and imitated the Jews in giving the name *gentiles* to all nations who were not Jews or Christians. In civil affairs the denomination was given to all nations who were not Romans.

Gentleman, in English law, every man above the rank of yeomen, including noblemen; in a more limited sense, a man who without a title bears a coat of arms, or one who is 'a gentleman by reputation,' through belonging to some liberal profession or holding some office giving him this rank.

Gentlemen-at-Arms, a body of forty gentlemen, headed by a captain, lieutenant, and standard-bearer, whose duties are to form a body-guard to the British sovereign on state occasions. The corps was established by Henry VIII. in 1509, under the name of the Band of Gentlemen Pensioners. Appointments to the corps are made by the sovereign, from a special list of retired officers kept by the commander-in-chief.

Gentoo′, a term applied by old writers to a native of Hindustan, or to the language.

Gentz (gents), FRIEDRICH VON, a German diplomatist and publicist, born 1764, died 1832. He was secretary to the directory of finances at Berlin when the French revolution broke out, of which he was an ardent opponent. He served alternately in the Prussian and Austrian civil service, and his pamphlets and manifestoes proved formidable obstacles to the invasions of Napoleon. He took part in the congresses of Vienna and Paris, as well as in others. Among his various works was a life of Mary Queen of Scots.

Genuflexion (from the Latin *genu*, knee, and *flectere*, to bend), the act of bending the knees in worship. There are frequent allusions to genuflexion in the Old and New Testaments, and it would appear that the use was continued among the early Christians. Genuflexion obtains, both by rule and prescription, in various places in the offices of the Roman Catholic Church, and at different parts of the services of the Church of England.

Genus, in scientific classification, an assemblage of species possessing certain characters in common, by which they are distinguished from all others. It is subordinate to *order*, *tribe*, and *family*. A single species, possessing certain peculiar characters which belong to no other species, may also constitute a genus, as the giraffe.

Geodes (jē′ōdz), round hollow nodules, containing sometimes earthy matters, sometimes a deposit of agate, sometimes quartz and spars crystallized. They are found more or less in all volcanic rocks, and have been formed by water depositing their materials in the hollows of those rocks.

Geodesy (jē-od′e-si), the science of surveying extended to large tracts of country; the branch of applied mathematics which determines the general figure and dimensions of the earth, the variations of the intensity of gravity in different regions, &c., by means of direct observation and measurement. See *Trigonometrical Survey*.

Geoffrey of Monmouth (called also *Geoffrey ap Arthur*), an ecclesiastic and historian of the 12th century. He sprang from the Norman settlers in Wales; became archdeacon of Monmouth, whence he was, in 1152, raised to the bishopric of St. Asaph. He died in 1154. His famous history was first published in 1128. This 'Chronicon sive Historia Britonum' is now known to be, as the compiler states, chiefly a translation from an ancient book in the Breton tongue, discovered by Walter Calenius, an archdeacon of Oxford. It contains a pretended genealogy of the kings of Britain from the time of the fabulous Brutus, or Brute, the Trojan, to the death of Cadwallader, king of Wessex, in 688. It was soon translated into French, English, and Welsh, and became a great source of romance to the writers of successive generations.

Geoffroy St. Hilaire (zhof-rwä san tē-lār), ÉTIENNE, French naturalist, born in 1772, died in 1844. He was educated at the colleges of Navarre and Lemoine, and became a favourite pupil of Haüy. At the age of twenty-one he obtained the chair of zoology in the Parisian Jardin des Plantes. As a member of the Egyptian expedition in 1798 he founded the Institute of Cairo, and returned about the end of 1801 with a rich collection of zoological specimens. In 1807 he was made a member of the Institute, and in 1809 professor of zoology at the Faculty of Sciences. He devoted himself especially to the philosophy of natural history. The fundamental idea brought conspicuously forward in all his works is, that in the organization of animals there is only one general plan, one original type, which is modified in particular points so as to present differences of genera. This view met with strong opposition from Cuvier. Among his principal works are Sur le Principe de l'Unité de

Composition Organique; Philosophie Anatomique; Histoire Naturelle des Mammifères, written in conjunction with Cuvier; Notions de Philosophie Naturelle (1838).

Geoffroy St. Hilaire, Isidore, physiologist and naturalist, son of the preceding, was born at Paris 1805, died 1861. He devoted himself to natural history, and in 1824 was appointed assistant to his father at the Jardin des Plantes. He was elected to the Academy of Sciences in 1833, and afterwards became successively inspector-general of the university, member of the council of public instruction, and professor of zoology at the Academy of Sciences. One of his chief works, Histoire Générale et Particulière des Anomalies de l'Organisation chez l'Homme et les Animaux, adds valuable confirmation to the theories of his father. He was the means of founding the Acclimatization Society of Paris.

Geog'nosy, a term which originated among the German mineralogists, and is nearly synonymous with *geology*. It is the science of the substances which compose the earth or its crust, their structure, position, relative situation and properties.

Geographical Societies are associations formed with the view of obtaining and disseminating geographical knowledge. In point of seniority the first of these associations is the Société de Géographie of Paris, founded in 1821, whose magazine, the Bulletin de la Société de Géographie, commenced in 1822. The Prussian Gesellschaft für Erdkunde held its first sittings in Berlin in 1828. The more important results of its investigations are published yearly in the Zeitschrift der Gesellschaft für Erdkunde zu Berlin. The Royal Geographical Society, established in London in 1830, has a capital of over £47,000, and large sums are devoted annually to aid the cause of geographical research, or spent in recognition of services to geography. The Geographical Journal is published by it monthly. The Royal Scottish Geographical Society, founded in 1884, also publishes a monthly magazine. The Russian Geographical Society, founded at St. Petersburg in 1845, has greatly extended our knowledge of Asia, and especially Asiatic Russia. The American Geographical Society was founded at New York in 1852, and publishes an interesting journal. Italy has her Società Geografica, founded at Florence in 1867.

Geography (from the Greek *gē*, earth, and *graphō*, I write), the science which treats of the world and its inhabitants, giving an account of the earth as a whole, and of the divisions of its surface, natural and artificial, describing the different countries, states, provinces, islands, cities, &c. It may be regarded as embracing several departments or branches. *Mathematical Geography* is that branch of the general science which is derived from the application of mathematical truths to the figure of the earth, and which determines the relative positions of places, their longitudes and latitudes, the different lines and circles imagined to be drawn upon the earth's surface, their measurement, distance, &c. *Physical Geography* treats of the physical condition of the earth, its great natural divisions of land and water, the atmosphere, and the movements of oceanic and aërial currents; the geological structure of the earth; and the natural products of the earth, vegetable and animal. It is concerned chiefly with general laws and principles, as they are manifested upon a grand scale, and in the organic kingdom with the existence of groups of animals and plants. This branch approaches at various points the sciences of geology, hydrology, meteorology, botany, zoology, and ethnology. *Political Geography* embraces the description of the political or arbitrary divisions and limits of empires, kingdoms, and states; and treats of their government, laws, social organization, &c.

The earliest idea of the earth formed by mankind seems to have been that it was an immense disc, in the centre of which their own land was situated, surrounded by the ocean, and covered by the sky as with a canopy. The Phœnicians were the first people who made any great progress in extending the bounds of geographical knowledge. They seem to have explored all the shores of the Mediterranean, and at an early period to have passed the Pillars of Hercules (the Strait of Gibraltar), and visited to some extent the Atlantic shores of Europe and Africa, extending their voyages as far north as Britain, and as far south as the Tropic of Capricorn. In the Homeric poems (which may be regarded as representative of the ideas entertained by the Greeks about the commencement of the 9th century B.C.) the earth is supposed to resemble a circular shield surrounded by a belt of water which was the source of all other streams. The world of Herodotus (born 484 B.C.) extended from the Atlantic to the western boundary of Persia, and from the Red Sea or Indian

Ocean to the amber lands of the Baltic. The Indian expedition of Alexander the Great (330 B.C.) greatly enlarged the ancient knowledge of Northern and Eastern Asia. About 320 B.C. Pytheas, a seaman of Massilia (ancient Marseilles), a Greek colony, sailed along the western coasts of Spain and Gaul, visited Britain, and, pursuing his voyage, discovered an island, henceforward famous as *Ultima Thule*, which is supposed to have been Iceland. Eratosthenes (276–196 B.C.) first used parallels of latitude and longitude, and constructed maps on mathematical principles. He considered the world to be a sphere revolving with its surrounding atmosphere on one and the same axis, and having one centre. The Geography of Strabo, a Greek of Pontus, written about the beginning of the Christian era, embodies all that was known of the science at that period. The countries lying round the Mediterranean were known with tolerable accuracy, but the Atlantic shores of Europe were very vaguely comprehended, while of the northern and eastern portions the most erroneous notions prevailed. Pomponius Mela, an early Roman geographer, wrote about the time of the emperor Claudius. He divided the world into two hemispheres, the Northern or known and the Southern or unknown; the former comprising Europe N. of the Mediterranean and W. of the Tanais (Don); Africa S. of the Mediterranean and W. of the Nile; and Asia. The next famous geographer is Ptolemy, who lived at Alexandria about the middle of the 2d century A.D. In Europe, Spain and Gaul were now correctly delineated, together with the southern shores of Britain. Northern Germany and the southern shores of the Baltic were pretty well known, as also some portion of Russia in the neighbourhood of that sea, and the southern part of European Russia. In Asia it was considered certain that there were wide regions inhabited by nomadic tribes called Scythians, while from the far east came some vague reports of China. The geography of Ptolemy remained the acknowledged authority during the whole of the middle ages. From his time up till the 13th century no advance was made in geographical knowledge until Marco Polo opened up new fields of inquiry. The account of his travels first made known to Europe the existence of Japan and of many of the East Indian islands and countries. Then followed the discovery of America in 1492, and from this time forward the progress of discovery was extremely rapid. In 1497 the Cape of Good Hope was doubled by Vasco da Gama, four years after its discovery by Bartholomew Diaz. Within thirty years from the date of the first voyage of Columbus the whole of the east coast of America from Greenland to Cape Horn had been explored. In 1520 Magellan passed the straits which bear his name, and his vessel, crossing the Pacific and Indian Oceans, returned to Europe by way of the Cape of Good Hope, being the first that had circumnavigated the globe. The west coast of America was explored as far as the Bay of San Francisco about the middle of the 16th century. At the same time discovery in the east advanced with rapid strides. Within twenty years of Gama's arrival in India the coasts of East Africa, Arabia, Persia, and Hindustan had been explored, and many of the islands of the great Archipelago discovered. The expeditions of Willoughby and Frobisher in 1553 and 1576, of Davis in 1585, of Hudson in 1607, and of Baffin in 1616, though they failed in their object of finding a N.W. passage to India, materially enlarged our knowledge of the Arctic regions. By the middle of the 17th century the Dutch, under Tasman and Van Diemen, made the Australasian Islands known to the world. Late in the following century Captain Cook added largely to geographical knowledge by his survey of the Pacific and its innumerable islands. The Antarctic continent was discovered in 1840 by American, English, and French expeditions, and the north-west passage round N. America was found by M'Clure in 1850. The travels of Humboldt, Spix and Martius, Lewis and Clark, Fremont, and others, have made us acquainted with the general features of the American continent. In Asia numerous travellers have contributed much to render our knowledge certain and precise in respect to a great part of the continent. The interior of Australia has been explored by Sturt, Eyre, Leichhardt, Burke, Wills, King, M'Douall Stuart, &c. The opening up of the African interior has been materially advanced by the explorations of a host of travellers, including Bruce, Park, Denham, Clapperton, the Landers, Burton, Speke, Grant, Baker, Barth, Livingstone, Rohlfs, Schweinfurth, Cameron, Stanley, &c. The progress which has marked recent discovery has been materially assisted by the governments of various countries, and by the numerous geographical societies formed during the present century.

The scientific study and teaching of geography are becoming more and more recognized to be of high importance, and in both at present Germany takes the lead. See also *Geographical Societies*, the articles on the different countries, and such articles as *Earth*, *Climate*, &c.

Geok Tepe, a town and fortress of Central Asia, oasis of the Akhal-Tekke-Turkomans, lon. 58° E., lat. 38° N. In 1879 the Russians under General Lomakine were defeated here with heavy loss, but in January 1881 it was stormed by General Skobeleff after a three weeks' siege, when about 8000 fugitives were massacred, no quarter being given.

Geology (Gr. *gē*, the earth, and *logos*, a discourse) is the science which treats of the history of the earth, as ascertained by the study of its exterior or crust, investigating the successive changes which have taken place in the rock-masses composing it, their relations, structure and origin, and discussing also the main features of the animal and vegetable life of the past as bearing on the earth's history. The present condition and conformation of the earth is the result of vast changes in the past and of agencies working through immense periods of time, and the same or similar agencies may still be seen at work producing similar changes. Thus rocks, both aqueous and igneous, are still being formed. The former receive their name from owing their origin mainly to water, which acts both chemically and mechanically on the crust of the earth, in wearing down rocks and soils and carrying the debris often to considerable distances. The sediments thus carried to sea, or into lakes and estuaries, are spread abroad in the water, and form stratified deposits, which in course of time solidify into rock. With sufficient time all land would thus be eventually degraded beneath the sea, were it not that the loss is compensated by disturbance and elevation of land always slowly taking place over great portions of the continents and islands of the world. Such disturbances have produced strange phenomena among the stratified rocks, which may be contorted, tilted up, dislocated, or otherwise changed from their original arrangement. The strata resulting from aqueous deposits are consolidated (petrified) chiefly by pressure and chemical decomposition and recomposition. Some formations are many thousands of feet in thickness. Contraction of the crust of the earth due to radiation of the heat of the earth into space, has also had immense effects, the result being that over broad areas rocky masses have been contorted and compressed to a great degree, and mountain ranges upheaved.

Igneous rocks also form a considerable portion of the visible crust of the earth, though much smaller in amount than those of sedimentary origin. Some of the igneous rocks consist of beds of volcanic ashes, others of old lavas, others of masses of matter which were intruded in a melted state from below among the strata. Granite is the most important and widely-spread of the igneous rocks, and is generally regarded as the fundamental rock of the earth's crust. Rocks that have been melted are known to be igneous by their structure, and also by the effects they have produced on the strata with which they are associated. Shales, sandstones, &c., are often hardened, bleached, and even vitrified at the points of junction with greenstone, basaltic, and felspathic dykes, or old lava beds, and the same kind of alteration takes place on a greater scale when large masses of igneous rocks have been intruded on the strata.

That the rocks which form the crust of the earth had the same general origin with the igneous rocks and sedimentary strata now forming has been well established, and that there is a regular succession of strata from the older to the newer, the oldest being normally lowermost, the newest uppermost, is also well ascertained. A corresponding succession in regard to the animal and vegetable life of former ages has also been proved by the fossils that accompany the successive strata. This *superposition of strata* and *the succession of life in time* are two cardinal doctrines in geology. Observation and experiment alike establish the doctrine of superposition. Thus at the edges of the strata on which London stands, the rocks known as the Woolwich and Reading beds are *seen* to lie on the chalk. Far within these edges, well-sinkers are well aware that often after sinking several hundred feet through the London clay the chalk is reached. In like manner proceeding westward across the middle of England, it is found that the Chalk rests on the Green-sands, the Green-sands on the Upper Oolites, the Lower Oolites on the Lias, the Lias on the New Red marl, and so on through lower members of the geological series of English rocks. Each great group of rocks consists of several subdivisions called *formations*, and each group, and even

to a considerable extent each minor subdivision, is characterized by the presence of distinct assemblages of organic remains. The successive appearance of such remains, which constitutes *the succession of life in time*, was the great discovery of Wm. Smith, made nearly a century ago. The main rock-systems into which the earth's crust is divided, and which are based on the characteristics of the organic remains contained in them, are shown in the following table in ascending order:—

Life Periods.	Rock Systems.
Post-Tertiary or Quaternary	Recent—Alluvium, Peat, &c. Pleistocene.
Tertiary or Kainozoic............	Pliocene. Miocene. Oligocene. Eocene.
Secondary or Mesozoic..........	Cretaceous. Jurassic. { Oolitic. Liassic. Triassic.
Primary or Palæozoic............	Permian. Carboniferous. Devonian and Old Red Sandstone. Silurian. Cambrian.
Archæan, Laurentian, or Eozoic..	Fundamental Gneiss.

Igneous rocks also are associated in different localities with the systems named in the foregoing table.

In the small area of Great Britain a more complete series of rocks exists than in any other part of the earth's surface of equal dimensions—so far as is known. The greater part of the European series is, indeed, nearly complete in England and Wales alone; and since the days of William Smith, the British rocks have generally been the types to which formations in other parts of the world have been referred.

Archæan, Pre-Cambrian, or *Laurentian Rocks.*—The *Laurentian* are the oldest known of the sedimentary rocks. They are *metamorphic* (that is, changed from their original structure), and mostly gneissic in character, and were for long classed as granitic and igneous rocks till their true nature was shown by Sir William Logan. They occupy vast tracts of country in Labrador and Canada. They there consist of two divisions, *Lower* and *Upper Laurentian.* The gneiss of the lower division is interstratified with several thick bands of crystalline limestone, in one of which a remarkable structure believed by Dawson, Carpenter, and others to be a foraminifer and called *Eozoon Canadense* was found. This is the oldest known fossil, if indeed it be a true fossil. In the Outer Hebrides and on the west coast of the North Highlands, rocks occur of highly metamorphic gneiss, which are probably of Laurentian age. The term Pre-Cambrian or Archæan is now applied to these rocks in the British area; they crop out also in North and South Wales, in the Malvern Hills, and in Charnwood Forest in Leicestershire. No fossils have yet been observed in these rocks. The *Huronian Rocks* of N. America are possibly intermediate in age between the Laurentian and the rocks next mentioned.

Cambrian.—These rocks come next in succession to the Laurentian strata. The term Cambrian has been used differently by different geologists. The purple grits and slates to which the term Cambrian was restricted by Murchison form the greater part of the group of hills in Wales that lie east of Cardigan Bay; they are also well seen in Carnarvonshire, where the celebrated slate quarries of Penrhyn and Llanberis lie in Cambrian strata. In most places they are unfossiliferous (or only doubtfully so), but at St. David's, in North Pembrokeshire, numerous fossils in purple shales among the lowest beds of the series have been found, including a small bivalve crustacean and two brachiopods. In a higher part of the series two sponges and various trilobites have been found. In Sutherlandshire, red Cambrian conglomerates lie on the Laurentian strata unconformably. Cambrian strata also occur in the hills of the Longmynd of Shropshire, in South Staffordshire, &c.

The *Silurian Rocks* were first worked out in detail in South Wales and the bordering counties by Sir Roderick Murchison, and an account of them published in the year 1839 in his Silurian System. The Silurian is divided into the *Lower* and *Upper Silurian.* The former comprises in ascending order the *Lingula beds* (so named from a characteristic fossil shell), the *Tremadoc slate*, the *Llandeilo flags*, and the *Caradoc* or *Bala beds.* The Lingula flags (*Potsdam sandstone* of North America) rest conformably on, and in fact pass by gradations into the Cambrian rocks. They are best developed in Wales, in Merionethshire, Carnarvonshire, and at St. David's, and consist of black and gray slaty rocks with beds of grit. The mass of hills that extends across the south of Scotland, from Wigtonshire on the south-west to St. Abb's Head on the eastern coast, is mostly formed of Lower Silurian strata. They chiefly consist of gray

grits and gray and black shales here and there containing fossils. Further south, in Cumberland, Westmoreland, and North Lancashire, Lower Silurian strata form the chief mass of the mountains known as the Cumbrian region. The Skiddaw region consists of black slates. Above these there lies a great series of volcanic rocks, consisting of felspathic lavas and ashes, commonly known as the green slates and porphyries. The Llandeilo flags in North Wales are named from the town of Llandeilo in Carmarthenshire, where they occur in a typical form. Above and passing into these lie the Caradoc or Bala beds (*Trenton limestone* of N. America). The most characteristic fossils of the Lower Silurian are the crustaceans known as trilobites, of which more than 200 species are known to belong to these rocks. Other fossils include hydrozoa, corals, echinodermata, numerous mollusca (brachiopods in particular, also lamellibranchiates, pteropods, gasteropods, cephalopods or cuttle-fishes). No fishes nor any other vertebrate animals have yet been found in the Lower Silurian rocks. The Lower Silurian rocks in the British and in some other areas were upheaved, contorted, and denuded before the deposition of the *Upper Silurian* strata, which, therefore, lie generally *unconformably* upon them. The chief groups forming the Upper Silurian are, in ascending order, the *Pentamerus beds* (so called from the brachiopod *Pentamerus oblongus*), the *Tarannon shale*, *Woolhope limestone*, *Wenlock shale*, *Wenlock limestone*, and *Ludlow rocks*, in the middle of which is the *Aymestry limestone*. In North America the Oriskany and Niagara beds are of this age. The Upper Silurian limestones are absent in Scotland and over the greater part of Wales. All of these formations are in general terms fossiliferous. The Wenlock limestone is in great part formed of corals, encrinites, shells, and trilobites, corals predominating. Near the top of the Upper Ludlow strata there are several thin bone-beds containing small teeth and scales and defences of placoid fish: with the exception of a fragment of a fish found in the Lower Ludlow beds in Shropshire, these are the oldest known fishes. Many geologists now classify the Silurian system very differently from the above method. They assign the Tremadoc and Lingula beds to the Cambrian formation; and the Llandeilo and Caradoc beds are put into a distinct formation called the *Ordovician.*

Old Red Sandstone and Devonian.—The *Old Red Sandstone* first received that name in contradistinction to the *New Red Sandstone*, the former occurring below, and the latter above the Carboniferous strata. Where the uppermost Silurian strata join the Old Red Sandstone there is a gradual passage between them. A broad belt of Old Red Sandstone crosses Scotland in a north-east direction between the Firth of Clyde and Montrose and Stonehaven. This broad tract lies unconformably on Lower Silurian clay-slates, and dips to the south-east under the *Carboniferous* or *coal-bearing rocks* that occupy the great central depression through which the Forth and Clyde chiefly run. On the south-east side of this broad undulating hollow the Old Red Sandstone again rises from beneath the *Coal-measures* with a general north-west dip, and skirting the Lammermuir Hills, strikes south-west into the sea south of Ayr. On the south side of the Lammermuirs it again appears on the hills between Berwick and Hawick, dipping under the Carboniferous rocks that, without a break, stretch from Berwick to the neighbourhood of Derby. The first compendious account of the Old Red Sandstone of Scotland was given by Hugh Miller, those rocks and the remarkable forms of fish (Pterichthys, Cephalaspis, &c.) they contain being till his time almost unknown. In North Wales and Cumberland narrow streaks of red sandstone here and there show themselves between the Silurian rocks and Carboniferous limestone. South of Coalbrookdale it ranges, in great force, through parts of Shropshire, Herefordshire, and Gloucestershire, into South Wales, where it stretches westward to the west coast of Pembrokeshire, the whole being about 8000 feet in thickness. These English and Welsh rocks are united by their fossils to the Old Red Sandstone of Scotland. The absence of marine shells and the nature of the fossil fishes of the Old Red Sandstone indicate that the formation was deposited, not in the sea, but in a great fresh-water lake, or in a series of lakes, for the nearest living analogues of many of the fish are the Polypterus of the African rivers, the Ceratodus of Australia, and in less degree the Lepidosteus of North America. In Canada, the sandstones of Gaspé are of Devonian age, as is found by their containing Cephalaspis.

The name *Devonian* has been given to a series of rocks in Devonshire bearing fossils

intermediate in character between those of the Upper Silurian and those of the Carboniferous limestone, and which are considered as the equivalents of the Old Red Sandstone of the west of England and of Scotland. The terms Devonian and Old Red Sandstone are thus generally considered equivalent in point of time. These rocks have been divided into *Lower*, *Middle*, and *Upper Devonian*. The lower beds chiefly consist of slaty beds, and green and purple sandstones, with brachiopods. The middle group, which includes the Plymouth limestone, contains numerous corals. The Upper Devonian group contains land plants (Stigmaria, &c., and many shells), some of which are identical with those found in the Lower Carboniferous limestone-shales.

Carboniferous Rocks.—In the south and middle of England, and in Ireland, the *Carboniferous Rocks*, so named on account of the masses of coal contained in them, consist chiefly of limestone at the base and Coal-measures above. Including the South Wales, the Forest of Dean, and the Somersetshire areas, a typical section of the beds is as follows:—

	Feet.		Feet.
Coal-measures	1000	to	12,000
Millstone grit	500	,,	1,000
Yoredale rocks	100	,,	1,000
Carboniferous or Mountain limestone	500	,,	2,500
Carboniferous limestone shale	100	,,	500
Yellow Sandstone, with plants	100	,,	200

Generally resting on Old Red Sandstone.

The *Yellow Sandstone* beds form a kind of passage from the Old Red Sandstone to the Carboniferous rocks, and the plants have carboniferous affinities. The overlying *shales* in Pembrokeshire, &c., contain numerous fish-teeth, Spirifers, Productas, and a few Lingulas (all brachiopods); and the *limestone*, which is more than 2000 feet thick in South Wales, near Bristol, and in Somersetshire, is also so highly fossiliferous that it may be stated that the whole of this limestone has once formed parts of animals. The *Yoredale* rocks of Yorkshire consist chiefly of shales and sandstones, with marine shells and occasional land-plants. The *Millstone grit* of South Wales is comparatively unfossiliferous, but sometimes contains the remains of plants, and more rarely marine shells. The *Coal-measures* and *Millstone grit* of Monmouthshire, Glamorganshire, and Pembrokeshire, lie in a great oval basin, encircled by a rim of limestone, beneath which lies the Old Red Sandstone. The Coal-measure beds consist of alternations of sandstone, shale, fire-clay or under-clay, coal, and ironstone. Underneath each bed of coal is a bed of under-clay with the roots known as Stigmariæ, forming the soil in which the plants were rooted, by the decay of which, passing into peat, material was supplied for the production of coal. The Gloucestershire and Somersetshire coal-field was originally joined to the South Wales Carboniferous rocks. The Coal-measures of the Bristol and Somersetshire coal-field are altogether about 7000 feet thick, and contain in all about forty-six beds of coal, with a total thickness of about 98 feet. The Coalbrookdale coal-field contains several bands of good nodular ironstone. There are in places twenty-two beds of coal, about ten of which are workable, some of them from 3 to 6 feet thick. The North Wales coal-field lies on a great thickness of Carboniferous limestone. The Denbighshire part contains at least seventeen beds of coal, most of which are worked, and the Flintshire part at least twelve beds. The basement beds of the South Staffordshire coal-field rest directly upon Upper Silurian rocks. This field, in the northern part, contains fourteen beds of coal. In the south several of these coalesce to form the thick coal, in places 40 feet in thickness, with two thin partings. The Warwickshire coal-field contains six beds of workable coal, besides ironstone. The Ashby-de-la-Zouch coal-field contains fifteen beds of coal. The Coalbrookdale, South Staffordshire, and Warwickshire coal-fields present so many points of resemblance, that undoubtedly they were all originally formed as one coal-field. North of this coal-field the Carboniferous rocks are somewhat modified in details. The Lancashire and Cheshire and North Staffordshire coalfields, exclusive of the Millstone grit, vary from about 3500 to 7500 feet in thickness, including about forty-six coal beds in North Staffordshire, and fourteen in Lancashire. There are also many beds of ironstone. The Nottingham, Derbyshire, and Yorkshire coal-fields united give about fifteen beds of workable coal. All these are ironstone areas, and North Stafford-shire is also the great pottery district of England. The Newcastle coal-field is about 1600 feet thick, and contains about sixteen beds of coal throughout the district. The lower coal-field of Northumberland is of the date of the Mountain limestone. A

smaller coal-field overlies the Carboniferous limestone north-east of Whitehaven in Cumberland. The Whitehaven Coal-measures, which lie on the Carboniferous limestone, have fourteen beds of coal. The great Scottish coal-fields lie in a broad synclinal hollow, in which are the valleys of the Clyde and Forth. The whole tract is about 100 miles in length, by 40 to 50 in breadth. The Carboniferous strata of the Lothians cross the Firth of Forth beneath the sea, and form great part of Kinross and Fife. By far the larger part of the surface of Ireland, from the southern coast to Lough Neagh and Donegal Bay, consists of the Carboniferous limestone series, lying sometimes on Old Red Sandstone, sometimes on Silurian rocks. There are a few small coal-fields, but these are merely the relics of one great coal-field that originally overspread the Carboniferous limestone of Ireland.

In the Carboniferous rocks more than 500 species of fossil plants have been named, a large proportion of which are ferns, including some tree-ferns. The remaining chief plants are gigantic clubmosses known as Calamites, Lepidodendron, and Sigillaria. Coniferous trees also occur, as do the wings and wing-cases of beetles and other insects, spiders, &c., and some reptile forms. In the purely marine series of rocks, of which the Carboniferous limestone forms the most important part, we find corals, very numerous crinoids, brachiopods also exceedingly numerous, and Lamellibranchiate molluscs. Many cuttle-fishes and numerous fish also occur; trilobites are scarce.

Coal-fields occur in France, Belgium, European Turkey, Hungary, Russia, India, China, Borneo, New Zealand, Australia, &c. The largest known coal-fields in the world are in the United States. See *Coal*.

The *Permian* series succeeds the Carboniferous rocks, and were long considered as part of the New Red Sandstone. They were named *Permian* by Sir Roderick Murchison, from the government of Perm, in European Russia, where they largely occur. They consist of sandstone, red marl, &c., and contain a bed of the magnesian limestone. Between the north of the Tyne and the neighbourhood of Nottingham the Permian rocks skirt the Carboniferous rocks, and lie on them unconformably. In Lancashire and Cheshire they chiefly consist of red marl and sandstone. The same rocks generally skirt the South Staffordshire coal-field, and the south part of the North Wales coal-field, and the east side of Colebrookdale, is also bordered by Permian marls and sandstones. The fossils of the Permian group are generically and specifically few in number, but as a whole their affinities and grouping are decidedly Palæozoic. All the Permian fish have heterocercal tails, like the majority of the Palæozoic genera, in which the vertebral column is prolonged into the upper lobe of the tail, whereas in the modern fishes the vertebral column is not prolonged into either lobe. Excepting the Magnesian limestone, all the Permian rocks are red, and all, including this limestone, seem to have been deposited, not in the sea, but in an inland salt lake, or in lakes.

The *New Red Sandstone*, or *Trias*, succeeds the Permian strata. It has received the name of *Trias* from the fact that when fully developed, as in Germany, it consists of the three great divisions of *Keuper*, *Muschelkalk*, and *Bunter Sandstein*. Few old genera and no species pass thus far upwards. The majority of the genera of Brachiopoda disappear, and the whole grouping of the fossils now ceases to be Palæozoic, and assumes a character common to the Secondary rocks. Triassic rocks extend from Devonshire along the Severn, round the eastern borders of the Palæozoic rocks of Herefordshire and North Wales. From thence they stretch eastward to the Permian and Carboniferous rocks of Lancashire, North Staffordshire, and Derbyshire. They surround all the midland coal-fields and Permian beds between Shrewsbury, Coventry, and Derby, and, everywhere unconformably overlying the Permian rocks, stretch north in a long band from Nottingham to the river Tees. In its greatest development in England, the Bunter series (of soft red sandstone and quartz conglomerate) is about 3000 feet thick. The Muschelkalk (absent in Britain) may be well seen, among other places, near Gotha, and at Eisenach in Thuringia. It is a gray shelly limestone, rich in fossil mollusca. No fossils are known in the Bunter Sandstones of England, though a few are found in equivalent strata on the Continent. In England, above the upper soft red sandstone are beds of red, white, and brown Keuper sandstone, and red marl, often ripple-marked, and containing bones and footprints, chiefly of Labyrinthodont reptiles, together with a few plants, and a peculiar fish. The rock-salt of England lies in the Triassic red marls of the plains of Lancashire, Cheshire, and

Worcestershire. This rock-salt was deposited in supersaturated salt lakes during the Keuper period; and this could only have been done by evaporation due to solar heat acting on the waters of salt lakes which had no outflow, like the Great Salt Lake of Utah, for example, or the salt lakes of Central Asia. The Keuper red marl (Upper Trias) varies from 500 to 2000 feet in thickness, and contains, besides other fossils, foot-prints and bones of reptiles. In the United States the Triassic rocks of Virginia and N. Carolina contain workable beds of coal. The red sandstone of the Connecticut valley is of Bunter age. Above the Keuper strata occur a series of beds called the *Rhætic beds*, from similar strata in the Rhætic Alps. All over England, wherever the base of the Lower Lias is well seen, the Rhætic beds, rarely more than 50 or 100 feet thick, are found to lie between the Lias above and the New Red Marl of the Trias below. They must be considered as true beds of passage between the red marl and the next series of strata. At the base of the Rhætic beds have been found minute teeth of the earliest known mammal (*Microlestes rhæticus*), a small insect-eating marsupial.

The *Lias* and *Oolite* series succeed the New Red and Rhætic beds. On the Continent of Europe the Lias and Oolite together are termed *Jurassic*, because in a typical form they are largely developed in the range of the Jura. The Lias in England consists, in descending order, of the Upper Lias shale, or clay; Marlstone; Lower Lias shale, or clay and limestone. The *Lower Lias* is about 900 feet thick, and consists of beds of blue clay interstratified with beds of blue argillaceous limestone, which is largely quarried in Leicestershire, Warwickshire, &c., for hydraulic lime. The Lower Lias is well exposed in the coast section at Lyme-Regis. From thence the Lower Lias strikes north to the junction of the Severn and Avon, and again N.E. and N. to the sea-coast of Yorkshire, E. of the river Tees. The Lower Lias clay and lime, as a whole, is rich in the remains of life. These include crinoids, decapod crustaceans, Terebratulæ, and other Brachiopoda, and numerous Lamellibranchiate molluscs. Cephalopoda, such as ammonites and belemnites, are especially numerous, together with species of nautilus. Fish are numerous, and there appear in the Lower Lias a great number of remarkable reptiles, some of gigantic size, as the Ichthyosaurus, the Plesiosaurus, and the well-known Pterodactyle. The *Marlstone* series, or *Middle Lias*, which is generally a brown, ferruginous, soft, sandy rock, is rich in many forms of ammonite and belemnite, &c. From the *Upper Lias clay* much alum shale, as also the well-known Whitby jet, is obtained. It is a stiff unfertile dark-blue clay. In Yorkshire, at the top of the Lower Lias and in the Marlstone, there are the well-known beds of ironstone so extensively worked at Middlesborough.

The *Oolitic* strata as a whole stretch across England from south-west to north-east, or from Portland Bill to North Yorkshire. The *Inferior Oolite*, the lowest member of the Lower Oolite, chiefly consists of beds of yellow limestone. Much of the limestone is oolitic, that is to say, it is formed of small concretionary bodies, like the roe of a fish, cemented together in a calcareous matrix. Above the Inferior Oolite limestone lies the *Fuller's earth*, so named because it contains in places beds of that substance. The formation consists of stiff blue clay, which varies in thickness from a few feet to 200 feet near Bath. The *Great or Bath Oolite* succeeds, and consists of Great Oolite, covered by *Forest Marble*, and passing downwards into *Stonesfield Slate*, which forms its base. The Stonesfield slate consists of beds of shelly laminated and oolitic limestone, with numerous fossils, among them remains of mammals, viz. the lower jawbones of four genera of small insectivorous marsupials. The Bath Oolite, of which the Forest Marble forms the upper part, is best developed near Bath, where it yields the celebrated stone of which that city is built. Among fossils of the Bath or Great Oolite are reptiles of the genera Teleosaurus and Megalosaurus, together with the gigantic Ceteosaurus (or whale-lizard), probably about 50 feet in length. During this part of the Oolitic epoch, while in the south of England the strata were exclusively marine, in the middle and north they were to a great extent estuarine, fresh-water, and terrestrial.

The *Middle Oolite* consists of the *Upper Calcareous Grit*, *Coral Rag*, *Lower Calcareous Grit*, *Oxford Clay*, and the *Kelloway Rock*. The Oxford Clay is a dark blue clay, about 600 feet thick where best developed, running in a long band of varying width from the coast of Dorsetshire to the Derwent, in Yorkshire. The Kelloway Rock is an occasional thin band of calcareous sandstone near its base. The Coral Rag is a rubbly limestone, trending, with occasional

interruptions, from Somersetshire to Yorkshire. It is associated in places with sandy strata known as the *Calcareous Grits*, and is often almost entirely composed of broken shells and sea-urchins.

The *Upper Oolite* consists of the *Portland Limestone and Sand* and *Kimmeridge Clay.* The Kimmeridge Clay is well exposed in Kimmeridge Bay, on the Dorsetshire coast, whence its name. Occasionally interrupted, it runs from thence north into Yorkshire. In places it is 500 or 600 feet thick, and consists of a stiff blue and sometimes black clay or shale. The Portland Limestone and Sand are best seen in the Isle of Portland. The celebrated Portland stone has been used in many public buildings, including St. Paul's. Like those of all the other Oolite formations it is cream-coloured, and generally fossiliferous.

In Scotland the Lias, Inferior Oolite, Middle Oolite, and Oxford clay occur in the Islands of Skye and Mull. On the east of Scotland, at and near Brora, in Sutherland, the Liassic and Oolitic strata have been long known. Oolitic rocks, known by the name of *Jurassic*, almost identical with those of Britain, occur largely in France; and the mountain range of the Jura, dividing France and Switzerland, is chiefly formed of Liassic and Oolitic rocks. From thence they range interruptedly northwards and eastwards, covering a large part of the plains of European Russia, and extending along the Himalayas.

As regards the fossil remains of the Lias and Oolite, a remarkable feature is the vast development of Cephalopoda, especially of the genera *Belemnites*, *Nautilus*, *Ammonites*, and *Ancyloceras*. There are also many genera and species of fishes, chiefly in the Lias, and the genera and species of reptiles are so numerous that this life-period has been sometimes called 'the age of reptiles.' The plants include ferns, horse-tails, conifers, cycads, &c. Viewed as a whole, the Liassic and Oolitic strata seem to have been deposited in warm seas round groups of islands formed of the older Palæozoic rocks of Europe, of which the Highlands of Scotland, Cumberland, and Wales formed parts, and from which rivers flowed, at the mouths of which the estuarine and fresh-water deposits of the north of England and Scotland were accumulated.

Purbeck and Wealden Strata.—These form a series of transition strata between the Oolite and the Cretaceous systems. They belong chiefly to the district of Kent and Sussex known as the Weald, and comprise the *Weald clay*, the *Hastings sands* and clays, and the *Purbeck limestones*, marls, and clays. The Purbeck beds, which succeed the Portland stone, are chiefly fresh-water strata, and the Hastings sand and Weald clay are almost exclusively fresh-water beds. Several remarkable reptiles occur in the Weald, including the Iguanodon, Plesiosaurus, and Pterodactyle, together with a number of Crocodiles.

The *Cretaceous Formation* is divided into a lower and an upper series of strata. The chief member of the former is the *Lower Green-sand*, forming a series of strata overlying the Wealden beds, and occurring in magnificent sections along the southern cliffs of the Isle of Wight and elsewhere round the Wealden area. The general characters of the whole formation are white, yellow, ferruginous, and gray and green sands.

The *Gault*, which forms the base of the *Upper Cretaceous* series, is a stiff blue clay about 300 feet thick in its thickest development. It appears in the Isle of Wight, ranges round the escarpment of the Weald, and in the centre of England, from the neighbourhood of Devizes to the Wash in Norfolk. In general lithological characters, the *Upper Green-sand* in places somewhat resembles the Lower Green-sand. In part of the Wealden area it is difficult to separate from the Gault, there being a passage from one to the other. In Wiltshire the Upper Green-sand is about 200 feet thick.

The *Chalk*, from its familiar characters and uniformity of structure, is the most easily recognizable of all the British formations. From west to east it stretches from the neighbourhood of Beaminster, in Dorsetshire, to Beachy Head and the North Foreland, and from thence north to Speeton, in Yorkshire. Its area in Europe and Asia is immense. It consists of a soft white limestone, and on examination with the microscope, much of it is found to consist of the shells of Foraminifera, Diatomacea, spiculæ and other remains of sponges, Polyzoa, and shells, highly comminuted. Somewhat similar deposits are now forming in the open Atlantic at great depths, chiefly of Foraminifera of the genus *Globigerina*. In its thickest development in England the Chalk is about 1200 feet thick (in Dorsetshire, Hampshire, &c.). The Lower Chalk usually contains no flints, and is somewhat

marly at the base, while the Upper Chalk is interstratified with many beds of interrupted flints. As a whole, the Chalk dips gently from its western escarpment to the east and south, underlying the Tertiary strata of the Hampshire and London basins, and reappearing with precisely the same characters on the coast of France. Beyond England it stretches through France, northward into Sweden, and eastward into Asia. Plants are comparatively few in the Chalk, but animal remains are very numerous. More than eighty species of fish are known; various great reptile forms, as the Mosasaurus, Plesiosaurus, and Ichthyosaurus, Pterodactyles, &c. In England, and generally in Europe, there is a marked discordance between the fossils of the Chalk and those of the overlying Tertiary rocks; no fossils (except, perhaps, one Terebratula) being common to the two groups. In America the Cretaceous epoch presents some extraordinary reptilian forms of immense size, also various birds. The sands and marls of New Jersey, U.S., are of this age, and similar beds occupy extensive tracts in the western regions; but there is no true white chalk in America.

Of the *Tertiary* strata the *Eocene Rocks* form the lowest division. In England these lie in two basins, those of London and Hampshire, both surrounded and underlaid by the Chalk. The strata are divided into the Lower Eocene and the Upper Eocene or *Oligocene*. The Lower Eocene rocks lie sometimes on upper beds of Chalk, and sometimes on beds lower in the series. They are therefore highly *unconformable*, and in this we have the reason of the complete difference in the species of the Cretaceous and Eocene rocks, for great continental areas of Chalk were upheaved above the sea, and remained as dry land for a period of time so long that when they were again submerged the life of Cretaceous times had died out, and other forms appeared. To the Lower Eocene belong the *Thanet Sand*, the *Woolwich* and *Reading* beds, the *London Clay*, and the *Bagshot Sands* and *Clays*. The London Clay usually consists of brown and bluish-gray clay, and in the London basin varies in thickness from 50 feet to 480 feet. Its fossil remains include various palm-nuts and other fruits and leaves. Remains occur of birds allied to the vulture and kingfisher, and a small swimming-bird with tooth-like serratures on the bill; turtles and river tortoises are numerous. The Upper Eocene or Oligocene includes the *Headon Hill Sands*, the *Osborne Beds*, *Bembridge Beds*, and *Hempstead Beds*, groups of strata belonging to Hampshire and the Isle of Wight. In these beds various Ungulate mammalia are found, such as the Anoplotherium, Palæotherium, a kind of river-hog, tapirs, &c. In France, in the Paris basin, the Eocene strata are largely developed. The Wahsatch, Bridger and Uinta beds of N. America are of Eocene age.

The *Miocene Rocks* are not found in Britain, but are well represented by strata (mostly of fresh-water origin) in Central France (Auvergne, &c.) and Switzerland. Over many parts of Europe, Asia, and America there are other Miocene strata, each more or less possessing peculiarities.

The *Pliocene* strata in Britain consist in descending order of the *Cromer Forest Bed*, *Chillesford Clay*, *Mammaliferous* or *Norwich Crag*, the *Red Crag* and the *Coralline* or *White Crag* of Suffolk. The *Coralline* or *White Crag* lies on the London clay in Suffolk, and consists of a patch of about 20 miles in length, and generally of less than 100 feet in thickness. It is rich in Polyzoa (formerly called Corallines, whence the name Coralline Crag). The general character of the climate seems to have been milder than at present. The *Red Crag* often lies in denuded hollows on the Coralline Crag, and is chiefly a ferruginous, shelly sand, very irregularly bedded. Many of its shells now live in British seas, and there are many reasons for believing that during the later part of the Eocene and through the Miocene epoch the area now called Britain was joined to the Continent. The *Mammalliferous* or *Norwich Crag* consists of sands, gravels, and shells, and contains remains of species of mastodon, elephant, hippopotamus, and horse, as also of the common otter, deer, &c. From the nature of the fossils it is believed to have accumulated near the mouth of a river.

The *Post-tertiary* or *Quaternary* Epoch is that immediately before the period in which we now are (the *recent*). It is characterized especially by various glacial phenomena, and in particular by numerous evidences of a glacial period, when the northern Hemisphere was subjected to a climate of the utmost rigour. During this period what is now the British Islands was in great part covered by glacier ice, probably as thick as that of the north of Greenland at the present day. When the most extreme cold prevailed, the mountains of Scotland and

Wales were literally smothered in ice. Much of the boulder clay which is found more or less all over the British Islands north of the Thames valley is simply the moraine matter of clay and boulders that in places lay below the ice, and was more or less urged forward by the advancing glacier mass. (See *Glaciers.*) It is believed that subsequently a slow submersion of the land took place, and that then icebergs deposited the stones, earth, &c., carried by them over part of what is now the low lands of England and other regions, and of neighbouring seas; hence the presence of sands, gravels, and clays, full of boulders and ice-scratched stones, intermingled with shells of arctic or semi-arctic type sometimes lying at heights of from 800 to 1200 and 1400 feet above the present sea-level. The same kind of phenomena are more or less universal over great part of Northern Europe and North America. On the elevation of the country after the cold had passed away Britain was reunited to the Continent, and Ireland to Britain, by plains of boulder-drift across which many mammalia (including the mammoth), migrated into the country, some of them for the second time. Man also migrated into the British area along with such mammalia. Among Post-tertiary plants there are Scotch firs, pines, yews, oaks, alders. The mammalian remains include those of elephants, rhinoceroses, hippopotamus, the common horse, bison, aurochs, red deer, roe-deer, Irish elk, Machairodus (a tiger?), &c. Many of these animal remains are found in the celebrated *bone caves*, several notable examples of which have been investigated in Britain. (See *Cave.*) In these have been found not only such remains as those of the cave bear, cave hyæna, fox, wolf, cat, lion, reindeer, Irish elk, bison, rhinoceros, elephant, &c., but also the works of man, such as flint implements, and on the Continent of Europe his skull and other bones associated with the above-named mammalia.

Geometrical Decorated, in architecture, applied to the earlier period of decorated Gothic, in which the tracery and other ornamentation consist entirely of distinct geometrical forms. See *Gothic Architecture.*

Geometrical Mean, the second of the terms of a geometrical progression containing three terms. The geometrical mean of two numbers is equal to the square root of their product. See next article.

Geometrical Progression, a series of numbers which increase or decrease by equal ratios; as, 2, 4, 8, 16, or 16, 8, 4, 2.

Geometry (Greek *gē*, earth, and *metron*, measure), as its name implies, was primarily the mathematical science which has for its object the measurement of portions of the earth's surface; but now geometry may be termed the science which treats of the properties and relations of definite portions of space, such as surfaces, volumes, angles, lines. The relation between the parts of the same figure may be of two kinds,—of position or of magnitude; for example, two points in a straight line, four points on the same circle, two straight lines perpendicular to one another, a straight line tangent to a circle are relations of position. On the other hand, the proportionality of homologous lines of two similar figures, the equality of the square constructed on the hypotenuse of a right-angled triangle to the sum of the squares constructed on the sides containing the right angle, that of the volumes of two pyramids on equal bases and of the same height, are relations of dimension. But the relations of position govern the relations of dimension, and *vice versa;* that is, the one set of relations depend upon the other. Thus it is because a triangle is rectangular that the square constructed on one of its sides is equivalent to the sum of the squares constructed on the other two, and, *vice versa*, that relation between the magnitudes of the squares on the three sides depends on the triangle being right-angled. The geometer may draw indifferently from the study of a figure either the knowledge of the relations of position or that of the relations of dimension, on the condition that he knows how to apply relations of the one kind to those of the other: and the principal aim of geometry is to examine into the connection between the relations of magnitude and those of position.

Geometry may be conveniently divided into several principal sections—elementary geometry, practical geometry, analytical geometry, infinitesimal geometry, &c. *Elementary geometry* comprehends two parts—plane geometry, the object of which is the study of the simplest figures formed on a plane by straight lines and circles; and solid geometry or geometry of three dimensions, which treats of straight lines and planes considered in any relative position whatever, of figures terminated by planes, of the cylinder, of the cone, and of the sphere. *Analytical geometry*, either plane or solid, makes

use of the method of co-ordinates introduced by Descartes and primarily applied to curves. In ancient times, though curves were studied and the principal properties of conic sections known, still no connection existed between these curves, nor was there any means of establishing one, so that the study of one was of no value to that of another. The first question in introducing the analytic method was then to fix upon some means which should serve to construct every curve by successive points as numerous and as closely brought together as is necessary in order to lay down the curve. Now the position of a point in a plane may be determined by two intersecting perpendiculars drawn from two fixed lines —the co-ordinate axes—at right angles to each other. An equation may then be found which states the relation between the co-ordinates of any point, that is, its distance from the two co-ordinate axes. (See *Co-ordinates*.) The study of the curves will thus be simply the study of their equations. In this way a typical equation for a curve in a certain system may be got, so that if at another time the curve is represented under another definition in investigating its equation in the same system of co-ordinates, particularized so as to simplify as much as possible the calculations, it will suffice to compare the particular equation with the general one to verify the identity of the curve, to give it its name, and to know all the properties of it which have been studied previously. In a similar way the analytical geometry of solid bodies is based on the fact that the position of any point in space can be determined by reference to three intersecting planes. *Infinitesimal geometry* is simply a continuation of the analytical geometry of Descartes, of which it may indeed be said it forms a part; the difference consists simply in the nature of the questions which, as they involve the measurement of magnitudes, the incessantly variable elements of which cannot be summed up by finite parts, require the use of the infinitesimal calculus. *Descriptive geometry* consists in the application of geometrical rules to the representation of the figures and the various relations of the forms of bodies according to certain conventional methods. In the descriptive geometry the situation of points in space is represented by their orthographical projections, on two planes at right angles to each other called the *planes of projection*.

History.—The origin of geometry is assigned by an ancient tradition to Egypt, but the history of the science, as far as it is known, commences in Greece with Thales (639–548 B.C.). To him is attributed the discovery of the properties of triangles. His disciple, Pythagoras (born about 580), founded a celebrated school in Italy where geometry was as highly honoured as philosophy. He discovered the theorem of the square of the hypotenuse, thus completing, so to speak, the geometry of polygons. He was also the first to show that the circle contains a greater area than any plane figure having the same perimeter, and that the sphere contains the greatest volume bounded by a given surface. After him Anaxagoras, Hippocrates of Chios, Theodorus of Cyrene, and Archytas of Tarentum cultivated the science and have left names connected with various problems, but the next great development of the science is due to Plato and his disciples, who laid the foundation of the analytical method and developed the fundamental principles of geometrical *loci*. Euclid, who belonged to the famous school of Alexandria, and flourished about 285 B.C., has the merit of collecting and systematizing all the more important problems and theorems worked out by his predecessors, besides adding many new ones of his own. He also wrote various other mathematical works, a book of Data, a treatise on Porisms, &c., most of which have been lost. It is in his Elements of Geometry, which are still the favourite textbook, that the method of proof known as the *reductio ad absurdum* is first found. After Euclid came Archimedes (287–212 B.C.). Among his achievements are the determination of the ratio of the diameter of a circle to its circumference, and the investigation of the areas of the circle and parabola and other problems much more difficult than any previously attacked. Archimedes had completed that branch, the object of which is the comparison with each other of magnitudes of the same nature; Apollonius (247 B.C.) made an analogous progress in that which treats specially of the properties of figures. His eight books of Conics, in which he considers these curves in the oblique cone, which had not been done until that time, contain almost all their interesting properties, those which relate to their foci, tangents, asymptotes, or diameters, and to their involutes. Eratosthenes, Nicomedes, the inventor of the conchoid;

Hipparchus, who made some progress in spherical trigonometry; Menelaus (80 A.D.); Ptolemy (125 A.D.), Pappus (390), and Proclus (440), continued the fame of the Alexandrine school. Diophantus introduced methods of an algebraic kind, and was the model on which the Arabic geometers, and Leonard of Pisa, Cardan, and finally Vieta formed themselves. He is thus the connecting link between the ancient and modern geometricians. After the sack of Alexandria and the burning of its library the science was confined to India and to the Arabic school of commentators, and it was not till the middle of the 16th century that geometry revived in Europe with Vieta (1540–1603), who introduced the use of algebraic symbols for the solution of geometrical problems. Trigonometry owes to him most of the elegant formulæ which now constitute it. In the writings of Kepler (1571–1631) we find the first applications among the moderns of the method of Exhaustions of Archimedes freed from the difficulties which had encumbered the geometry of the Greeks; and to Cavalieri (d. 1647) belongs the honour of an entirely new method for quadratures and cubatures. Descartes (1586–1650), developing Vieta's discoveries, created the science of analytical geometry, which greatly extended the domain of geometrical science. Fermat (1570–1633) and Barrow (1630–77) with their methods of tangents and of maximums; Huyghens (1629–95), with the theory of involutes, were on the road to the differential calculus, as Roberval, Pascal, and Wallis with their processes of summation were to the integral calculus. Newton (1642–1727) and the brothers Bernouilli (1654–1705, 1667–1748) made important contributions, such as the theorem on the generation of curves of the third order and the method of isoperimeters. About the beginning of the 19th century a decided advance was made by Monge (1746–1818) and Carnot (1753–1823). The Descriptive geometry of the former established the whole theory of projections. Carnot's first contribution to geometrical science was his principle of the *correlation of figures*, a principle which, having been farther generalized, is now known as the *principle of continuity*. His second contribution was his *theory of transversals*. On these inventions is founded *modern geometry*, which has revolutionized the science, and has given us generalized conceptions previously undreamed of. Amongst the later geometricians who have contributed to extend the methods and domain of the science we may mention Poncelet for his theory of reciprocal polars, Chasles for his treatise on porisms, &c.; Sir William Rowan Hamilton for his invention of quaternions, an entirely new method; Cayley and Sylvester for their application of generalized geometrical methods to space of more dimensions than three.

Geoph'agism, or DIRT-EATING, the practice of eating some kind of earthy matter, clay, chalk, &c., common amongst uncivilized peoples, such as the South American Ottamacs, the Indians of the Hudson Bay country, the West Indian blacks, the negroes in some of the United States of America, and others. In some cases it is probably used to allay hunger, but it is also practised where the supply of food is sufficient. Amongst chlorotic young women a similarly depraved appetite is not uncommon.

George, DUKE OF SAXONY (*the Bearded*), born in 1471, died in 1539, was the son of Albert the Brave, the founder of the Albertine line of Saxony, and succeeded in 1500 to the hereditary dominions of the Albertine house. Later on he became involved in the turmoils of the Reformation period. He was not at first wholly hostile to reform, but thought that it could be better effected by means of Papal edicts than by the revolt of Luther. Accordingly he became embittered by the uncompromising tone of Luther's later writings, and endeavoured to suppress the Reformation in his dominions by violent measures. These, however, were unsuccessful, and in 1539, on the accession of his brother Henry, who was a Protestant, the Reformation was introduced into the dominions of the Albertine house of Saxony.

George, ST., a saint venerated both in the eastern and western churches, and the patron saint of England. He was canonized in 494 or 496 by Pope Gelasius. His origin is very obscure, one of many legends representing him as a prince of Cappadocia martyred by Diocletian. Gibbon has sought to identify this legendary saint with the notorious and turbulent Arian heretic George of Cappadocia, who was slain in 361 in a rising of the populace who had been infuriated by his oppression and his violence against pagans and orthodox. But the most eminent scholars, both Roman Catholic and Protestant, are of opinion that the veneration of St. George has been traced up to so early a period as to make it very improbable that a notorious Arian could have been foisted on the Cath-

olic Church as a saint and martyr. The killing of a dragon that was about to swallow a maiden is a legendary feat attributed to him. He was adopted by the Genoese as their patron saint, and in 1222 the Council of Oxford ordered that his day (the 23d of April) should be observed as a national holiday in England; in 1350 he was made the patron of the order of the Garter by Edward III.

George, Order of St. The following are the principal of the numerous orders which have been founded in honour of St. George:—(1) A military order instituted in Russia in 1769 by the Empress Catharine II. as a reward of military achievements. It consists of four classes, to which a fifth, intended for non-commissioned officers and privates, was added in 1807. (2) An order instituted in Bavaria by the Emperor Charles VII. (Charles Albert) in 1729, and reorganized by King Louis II. in 1871. Since the reorganization the order, which had previously been a mere decoration for the nobility, has devoted itself to such services as the care of the wounded on battlefields, &c. (3) An order instituted by Ernest Augustus of Hanover in 1839. (4) A Sicilian military order, instituted by Joseph Napoleon 24th February, 1808, and remodelled by King Ferdinand IV. in 1819. (5) The name under which the order of the Garter was first instituted in England. See *Garter* (*Order of the*).

George, St., one of the Bermudas. It is about 3 miles long and half a mile broad, is fortified, and contains a port of the same name, which is a British military station.

George, The, a badge exhibiting the figure of St. George encountering the dragon, worn pendent from the collar by the knights of the Garter. See *Garter*.

George I. (George Louis), King of Great Britain, and Elector of Hanover, was the son of the Elector Ernest Augustus, by Sophia, daughter of Frederick, elector palatine, and grand-daughter to James I. He was born May 28, 1660, and in 1682 was married to Sophia Dorothea of Zell, whom, in 1694, on accoant of a suspected intrigue with Count Königsmark, he caused to be imprisoned and kept in confinement for the rest of her life. In 1698 he succeeded his father as elector. He commanded the imperial army in 1707 during the war of the Spanish succession; and ascended the throne of Great Britain on the death of Queen Anne in 1714. Amongst the notable events of his reign were the rising of the Scottish Jacobites (1715-16); the Triple and Quadruple Alliances against Spain (1717 and 1718); the failure of the South Sea Company (1720). The private character of George I. was bad, but he showed much good sense and prudence in government, especially of his German dominions. By Sophia Dorothea he had a son, George, afterwards George II. of England, and a daughter, Sophia, the mother of Frederick the Great. He died in 1727.

George I., "King of the Hellenes," was born at Copenhagen Dec. 24, 1845, second son of the king of Denmark. In 1863 he was elected king by the Greek National Assembly. In 1867 he married the Princess Olga, a niece of the Russian czar. His conduct as a constitutional monarch has always been correct and regular, and he has won the popular sympathies by the efforts he has made on behalf of the expansion of Greek nationality. His children are all bred up in the Greek faith. The crown prince is Constantine, Duke of Sparta, born 2d Aug. 1868.

George II. (*George Augustus*), King of Great Britain, son of George I., was born Oct. 30, 1683. He married in 1705 Wilhelmina Carolina of Brandenburg-Anspach. In 1708, then only electoral prince of Hanover, he distinguished himself at Oudenarde under Marlborough. In 1727 he succeeded his father on the English throne, but inherited to the full the predilection of George I. for Hanover. His reign is notable for the great events with which it is filled, and for the number of men great in art, letters, war, and diplomacy which then adorned England. The war of the Austrian Succession, in which George II. himself took part at Dettingen, the Jacobite rebellion of 1745, the conquest of Canada, and the growth of the British empire in India are amongst the chief events of his reign. George II. died suddenly Oct. 25, 1760. He was a prince of very moderate abilities, regardless of science or literature; of obstinate temper and vicious habits; but honest and open in his disposition.

George III., King of Great Britain, born in 1738, was the eldest son of Frederick, prince of Wales, by the Princess Augusta of Saxe-Gotha, and succeeded his grandfather, George II., in 1760. In the following year he married the Princess Charlotte Sophia of Mecklenburg-Strelitz. The sixty years of his reign are filled with great events, amongst which are the Wilkes' con-

troversy, the American revolution, 1775–83; the French revolution, 1789, and the Napoleonic wars which followed; the Irish rebellion, 1798, &c. George III. was a man of conscientious principles and of a plain sound understanding, though hardly enlarged enough for the great responsibilites of his position. His narrow patriotism, his obstinate prejudices, and blind partialities were even more hurtful to British interests than the indifference of his predecessors had been. His tastes and amusements were plain and practical, literature and the fine arts receiving but a small share of his attention. His private life was very exemplary. In 1810 the king's mind, which had already given way several times, finally broke down, and from that time to his death on Jan. 29, 1820, his biography is a blank.

George IV. (*George Frederick Augustus*), King of England, son of George III. and the Princess Charlotte of Mecklenburg-Strelitz, born in 1762, died June 26, 1830.



Lake George.

His dissipated life, his extravagance, his supposed marriage with a Catholic, Mrs. Fitzherbert, alienated from him the affection of his father and the esteem of the nation. In 1795 he married the Princess Caroline of Brunswick, from whom he soon separated, and who was afterwards tried for adultery in 1820 and acquitted. In 1811 George became regent, and, on the death of George III. in 1820, king. The most important event after his attaining the throne was the passing of the Catholic Emancipation Act, by the Wellington ministry, in 1829. George IV. left no descendants, his only daughter, the Princess Charlotte, wife of Leopold of Saxe-Coburg, having died childless in 1817. He was therefore succeeded by his brother, William, duke of Clarence (William IV.). See *Britain*.

George, Lake, a lake in New York state, between Warren and Washington counties, south of Lake Champlain, into which it discharges at Ticonderoga. It is 36 miles long, and from ¾ mile to 4 miles in width. It is surrounded by lofty hills wooded to the top, has richly wooded shores, and many picturesque islands. Caldwell, Bolton, and other places on its banks are favourite resorts, and in summer large numbers of tourists are attracted by the beauties of its scenery.

George-noble, a gold coin of the time of Henry VIII. of the value of 6*s*. 8*d*. sterling; so called from bearing on the reverse the figure of St. George killing the dragon.

George's Channel, St., the arm of the sea which separates Ireland from Wales south of the Irish Sea. From Holyhead and Dublin on the north to St. David's Head and Carnsore Point it extends about 100 miles, with a breadth varying from 50 to 70 miles. Its depth in the middle varies from 40 to 70 fathoms. The bottom is chiefly sand and gravel.

Georgetown, a port of entry in the United States, in the district of Columbia, on the left bank of the Potomac, 2 miles west of Washington, with which it was incorporated in 1878. It is beautifully situated on a range of hills, and abounds with villas and country seats. It contains the Georgetown college (the oldest Catholic college in the United States), the Peabody library, &c. The Chesapeake and Ohio canal commences here.

Georgetown, or DEMERARA, the capital of British Guiana, at the mouth of the Demerara. It is neatly built, consisting of broad streets at right angles, with canals in the middle, and lofty wooden houses, often with luxuriant gardens attached. There is a bar at the mouth of the river, and large ships have to discharge and load by means of lighters. Georgetown is the seat of an Anglican bishop, and has a number of churches, schools, hospitals, &c. The chief exports are sugar, rum, and coffee. Pop. 53,176, about one-seventh being whites.

George Town. See *Penang*.

Georgia (by the Russians called *Grusia*, and by the natives themselves *Karthli*), was formerly a kingdom, but is now included in the Russian government of Tiflis, though the name is sometimes loosely employed to designate a much larger portion of the territory possessed by Russia south of the Caucasus. In the latter sense it has an area of say 34,000 square miles, but Georgia proper does not exceed about 15,000 square miles. The natives are a fine-looking race, the Georgian women, like the Circassians, being celebrated for their beauty. The Georgian language, together with that of the Mingrelians, Lazes, and other Caucasian peoples, seems, according to the latest researches, to form a perfectly distinct linguistic family. It possesses a not unimportant literature, commencing with the introduction of Christianity into the country. The history of the Georgians first becomes trustworthy about the time of Alexander the Great, to whom they became subject. About B.C. 324 they gained their independence under Pharnavas. They became Christianized towards the end of the 4th century. After yielding for a time to the supremacy of the Arabian caliphs Georgia regained its independence towards the end of the 10th century, which it retained till 1799, when Heraclius, successor of George XI., formally ceded his dominions to the Russian emperor Paul.

Georgia, one of the Southern United States, bounded N. by Tennessee and North Carolina, E. by South Carolina and the Atlantic, S. by Florida, and W. by Alabama; length, north to south, 320 miles; breadth, 255 miles; area, about 58,000 sq. miles (same as England and Wales). The coast is bordered by a chain of islands, separated from the mainland by narrow lagoons or sounds. On them the famous sea-island cotton is raised. The land is low towards the coast, beginning as a salt marsh, grown over with tall reeds, continuing next as swampy rice plantations and then as 'pine barrens' about 60 or 90 miles inland, latterly gradually rising as a sandy district, interspersed with fertile tracts, till it reaches the lower falls of the Savannah, Ogechee, Oconee, and other rivers. Here the hilly and finally mountainous region called the Upper Country begins, a fertile and salubrious region extending north and west till it rises into the Appalachian mountain chain. Of the rivers the Chattahoochee, which flows under the name of the Appalachicola into the Gulf of Mexico, is navigable for steamers for 300 miles; the Savannah is navigable for steamers part of the year for 250 miles; and the Altamaha and its affluents are navigable for small vessels 300 miles upwards. The climate is mild, but unhealthy in the low country during July, August, and September. The soil in many parts is very rich. Cotton, rice, maize, and the sugar-cane are the staple productions; but tobacco, the sweet potato, and other crops are cultivated with success. The fruits, which include peaches, apples, melons, oranges, bananas, &c., are of the finest. Copper and iron, also gold in considerable quantities, are found in the northern parts. Atlanta is the seat of the legislature and largest town; the other principal towns are Savannah (the chief seaport), Augusta, Macon, and Columbus. A charter for the foundation of a colony in the territory now called Georgia was obtained in 1732 by General Oglethorpe from George II., after whom the state was named. Georgia was one of the thirteen original states. In 1788 it adopted the constitution of the United States by a unanimous vote. In January, 1861, Georgia seceded with the Confederates, took an active part in the civil war, and was conquered by a Federal army under General Sherman (1864–5) and restored to the Union, since which, however, it has been twice occupied by U.S. troops on account of disagreements between Congress and the State legislature regarding the constitution. The population in 1890 was 1,837,353, of whom somewhat more than one-half were whites.

Georgia, GULF OF, a large gulf of the North Pacific Ocean, between the continent of North America and Vancouver's Island; about 120 miles in length from north to south; the breadth varies greatly in its different parts, from 6 miles to 20. It communicates with the ocean on the north by

Queen Charlotte's Sound, and on the south by the Strait of Juan de Fuca.

Georgia, South, an island in the South Atlantic, lat. at its north point, 53° 57′ s.; lon. 38° 13′ w. It is 90 miles long, and has high and rocky coasts, inaccessible from ice during a great part of the year. It abounds with seals and sea-fowl.

Georgia Bark (*Pinckneya pubens*), a small tree of the Southern U. States closely resembling the cinchona or Peruvian bark, and belonging to the natural order Cinchonaceæ. It has pretty large white flowers, with longitudinal stripes of rose-colour, disposed in beautiful clusters at the extremities of the branches; each flower is accompanied with a floral leaf, bordered with rose-colour near the upper margin; the corolla is tubular; the stamens five, with a single style; and the capsule contains two cells and numerous seeds. The wood is soft and unfit for use in the arts. The inner bark is extremely bitter, and is employed with success in intermittent fevers.

Georgian Bay, formerly called Lake Manitoulin, the north-eastern part of Lake Huron, partly separated from the main body of the lake by the peninsula of Cabot's Head and the island of Great Manitoulin. It is about 120 miles long and 50 broad.

Georgium Si'dus, the name given by Herschel to the planet which he discovered 13th March, 1781, and which is now known as Uranus.

Geot'ropism, in botany, a disposition or tendency to turn or incline towards the earth, as the characteristic exhibited in a young plant when deprived of the counteracting influence of light, of directing its growth towards the earth.

Geotru'pidæ, a family of burrowing lamellicorn beetles. They inhabit temperate climates, and are useful in removing disgusting substances. When alarmed they feign death. The *Geotrūpes stercorarius*, or watchman-beetle of Britain, is the type of the family.

Gera (gā'rā), chief town of the principality of Reuss-Schleiz, in Germany, on the right bank of the Elster, 35 miles s.s.w. of Leipzig. It has manufactures of woollen, linen, cotton, and other goods. Pop. 39,599.

Gerace (je-rä'chā), a town of S. Italy, province of Reggio di Calabria, 36 miles N.E. of Reggio. The cathedral, once a handsome structure, was ruined by the earthquake of 1783. Pop. 9511.

Gerando. See *De Gerando.*

Gerania'ceæ, a nat. order of exogenous plants, the distinguishing character of which is to have a fruit composed of five capsules or cases, connected with as many flat styles, consolidated round a long conical beak, giving some of the species the name of stork's-bill and crane's-bill. These plants are usually astringent and odoriferous, and many of them have beautiful flowers, especially those of the genus *Pelargonium*, natives of the Cape of Good Hope. The species are mostly herbaceous plants. A few of them have edible tubers. See next article.

Geranium, the typical genus of the order Geraniaceæ (which see), popular name crane's-bill. They have usually palmately divided leaves and regular flowers with ten stamens and five carpels. Some thirteen species are wild in Britain, of which the *G. robertianum* or herb-robert is the most common. An American species, *G. maculātum*, from its astringency called 'alum-root,' is used medicinally as a gargle and otherwise. The so-called geraniums of our gardens belong to the genus *Pelargonium.* Cultivation has produced many varieties, which from their beauty are great favourites.

Gérard (zhā'rär), François Pascal, Baron, a French historical and portrait-painter, born at Rome in 1770; went to Paris (1786), and studied under David. In 1795 he exhibited his first notable painting, Belisarius. He was much patronized by Napoleon, for whom he painted the battle of Austerlitz, and was made a baron by Louis XVIII., after completing his large painting of the Entrance of Henry IV. into Paris. Amongst his portraits the most famous are those of Talleyrand, Talma, Louis Philippe, Madame Récamier, Mdle. Mars, &c. He died in 1837.

Gérard, Jean Ignace Isidore, a French caricaturist and book illustrator, generally known under the pseudonym of Grandville, was born at Nancy in 1803, died at Paris in 1847. He went to Paris in 1824, and after some minor works acquired great popularity in 1828 by his Metamorphoses du Jour, a representation under the guise of animal heads of human foibles and weaknesses. Later on he became a contributor to Le Charivari and an illustrator of the works of Béranger, La Fontaine, Gulliver's Travels, Robinson Crusoe, &c.

Gérard, Maurice Étienne, Count, Marshal, and Peer of France, born 1773. He served as a soldier during the republic and the empire, distinguishing himself at Aus-

terlitz and other battles. In 1813 he was made a general of division and count. He distinguished himself in the battle of Ligny, and at Waterloo acted under Grouchy. He took an active part in the revolution of 1830; became war-minister and marshal; commanded the troops which reduced Antwerp in 1832; became prime-minister 1834; commander of the national guard 1838; died at Paris in 1852.

Gérard de Nerval, the pseudonym of Gérard Labrunie, French man of letters, born in Paris 1808. His earlier productions were poetic, Elégies nationales and Poésies diverses. As an adherent of the Romantic school he set himself to translate Goethe's Faust, and performed it in a manner which the old poet himself pronounced a marvel of style. Amongst his best works are his short tales and sketches, Voyage en Orient, Contes et Facéties, La Bohême Galante, &c. He became insane and committed suicide in Paris, 1855.

Gerasa (je-rä'sä), GERASH, or DJERASH, a ruined town in Syria, 80 miles S.S.W. of the town of Damascus. It was several times destroyed and rebuilt. The ruins comprising ancient walls, gateways, a forum, baths, theatres, and temples are very extensive.

Gerba, or JERBA, an island in the Gulf of Cabes, off the coast of Tunis. It is about 20 miles long and 14 broad. The surface is level and fertile, and occupied by a population of 30,000, mostly Berbers.

Gerbil'lus, a genus of small burrowing rodents (the gerbils) of the family Muridæ (mice). They have a long tail, which is tufted at the end. There are several species, found in the sandy parts of Africa and Asia. The Egyptian gerbil (*G. ægyptiacus*), inhabiting Egypt around the pyramids, is the type. It is about the size of a mouse and of a clear yellow colour.

Gerfalcon. See *Falcon.*

Gerhard (ger'härt), EDUARD, a German archæologist, born 1795, died 1867. Having travelled in Italy, he devoted himself to archæology, and in 1829 took part in founding the Archæological Institute at Rome. Returning to Germany in 1837, he became archæologist at the Royal Museum at Berlin, and afterwards professor at the university. Among his numerous works are the following:—Antike Bildwerke (with 140 plates); Auserlesene Griechische Vasenbilder (330 plates); Etruskische und Campanische Vasenbilder, Griechische Mythologie, &c.

Gerhardt (ger'härt), KARL FRIEDRICH, German chemist, born 1816. He studied under Liebig at Giessen; went to Paris in 1838, was appointed professor of chemistry at Montpellier, returned to Paris in 1842 to pursue his investigations; went in 1855 to Strasburg as professor in chemistry and pharmacy, but died soon after, in 1856. Gerhardt is the author of several works, amongst which the most celebrated is his valuable Traité de Chimie Organique. He was the first to introduce the new combining weights, or rather to subject more completely combination by weight to combination by volume; to originate the theory of types, and to furnish new ideas on classification, homology, and similar subjects. The methods he originated have had a great influence on modern chemistry.

Gerhardt, PAUL, the greatest of German hymn-writers, born in 1607. He studied theology, became pastor of Mittenwalde in 1651, and afterwards at Berlin. A strict Lutheran, he opposed energetically all attempts to unite the Lutheran and Reformed Churches, and was removed from his church in 1666 in consequence of his refusal to subscribe to the edict of 16th Sept. 1664, prohibiting mutual insults or offensive language between the churches. In 1668 he was made archdeacon in Lübben, where he died in 1676. His excellent book of hymns appeared at Berlin in 1667 (Geistliche Andachten). Many particular hymns have found English translators.

Géricault (zhā-rē-kō), JEAN LOUIS THÉODORE ANDRÉ, a French painter, born at Rouen in 1791; came to Paris in 1806 and studied under Charles Vernet and Guérin. His first pictures (the Chasseur Officer and the Wounded Cuirassier) were exhibited in 1812 and 1814. In 1817 he visited Italy, returned to Paris in 1819, and painted the Raft of the Medusa (a well-known shipwreck of the time), a work of much power, which won immediate popularity. He died at Paris in 1824.

Geri'zim Mount. See *Ebal.*

Germ, in physiol. the earliest form under which any organism appears, that is the rudimentary or embryonic form of an organism. The name is also given to certain minute organisms which give rise to disease. See *Germ Theory.*

Germain (zher-maṇ), ST., the name of a number of places in France, among which is St. Germain-en-Laye, a town in the department of Seine-et-Oise, about 6 miles north

from Versailles and 11 miles W.N.W. from Paris, on the left bank of the Seine. The most remarkable building is the royal palace, commenced by Charles V. in 1370, and embellished by several of his successors, especially Francis I. and Louis XIV. It was used as a prison during the revolution, afterwards as a school for cavalry officers, and was ultimately restored in 1862 by Napoleon III., who established in it a museum of Gallo-Roman antiquities. The forest of St. Germain is one of the finest in France, extending over 10,000 acres. Pop. 14,280.

German Catholics, a religious sect which sprung up in Germany about the close of the year 1844 The immediate cause of its formation was the exhibition by Arnoldi, bishop of Trèves, of the holy coat preserved in the cathedral of that city, accompanied by a promise of plenary indulgence to whoever should make a pilgrimage to Trèves to worship it. The announcement caused a general feeling of astonishment in Germany, and two priests, Johannes Ronge of Silesia and Johann Czerski of Posen, whose independent views had already caused the deposition of the one and the secession of the other, led a secession movement, appealing to the lower grades of clergy to unite in founding a national German church independent of the pope. A number of congregations were formed, especially in Leipzig, under the celebrated Robert Blum, and in Magdeburg under the teacher Kote. Two creeds were drawn up for the new church, the *Confession of Schneidemühl*, by Czerski, which, though substantially Roman Catholic, rejected indulgences, purgatory, auricular confession, &c., and the *Confession of Breslau*, drawn up by Ronge. The latter, which was much less orthodox, was substantially adopted by the Council which met at Leipzig March 22, 1845. The organization was almost the same as that of the Presbyterian Dissenting churches of Scotland. Each congregation was to choose its own pastor and elders. For a time the new church had a great success. Many Protestants joined the body, which, by the end of 1845, numbered nearly 300 congregations. Difficulties soon arose, however. The majority of the German governments began to use repressive measures. More fatal were internal dissensions, one party, headed by Czerski, clinging to the traditions and doctrines of the Roman Catholic Church, the other, headed by Ronge, tending to mix up democratic and socialistic principles with their creed. The result, in spite of several attempts to re-establish unity, was disintegration and decay. The congregations rapidly dwindled, many being readmitted, to the state church, and, especially after the rise of 'Old Catholicism,' the movement lost all importance.

German Confederation. See *Germany*.

German'der, the common name of three British plants of the genus *Teucrium*, order Labiatæ, namely *T. Chamædrys*, common or wall-germander, *T. scordium*, water-germander, and *T. scorodonia*, wood-germander or wood-sage. They were all formerly used in medicine, and are still employed by country herbalists. Two species belong to N. America, *T. canadense* and *T. virginicum*.

Germander Speedwell. See *Speedwell*.

German'icus, CÆSAR, a distinguished Roman, son of Nero Claudius Drusus and the younger Antonia, a niece of Augustus, was born B.C. 15. He was adopted by Tiberius, his paternal uncle, and married Agrippina, the granddaughter of Augustus. When Augustus died, in A.D. 14, Germanicus was invited by the rebellious legions on the Rhine to assume the sovereignty, but refused, and quelled the revolt. He then crossed the Rhine, surprised and defeated the Marsi with great slaughter. Next year (A.D. 15) a campaign against the Catti and the Germans, led by Arminius, resulted in a series of victories. The following year he again made his way into Germany, defeated the Cherusci twice, and made an incursion into the country of the Marsi. Tiberius now became jealous of the glory of Germanicus, called him home under pretence of granting him a triumph, then, to get rid of him, sent him into the East to compose the disturbances in Armenia and Cappadocia. This he performed in A.D. 18, visited Egypt the following year, and died on his return to Syria (A.D. 19) under some suspicion of having been poisoned by Cn. Piso, the governor of Syria.

German Ocean. See *North Sea*.

German Paste, the name given to a kind of paste made for feeding cage-birds, such as canaries, larks, nightingales, &c. The following is one of various recipes: one pound of pea-meal, half a pound of blanched sweet almonds, two ounces of fresh butter, two ounces of moist sugar, fifteen grains of hay saffron. Mix and beat well with a little water, pass through a cullender, then expose to the air till dry.

German Sarsaparilla, a name given to the roots or rhizomes of *Carex arenaria*, *C. disticha*, and *C. hirta*, from their being occasionally used in Germany as a substitute for sarsaparilla.

German Silver, NICKEL SILVER, or PACKFONG, is an alloy of copper, nickel, and zinc in different proportions, amongst which the following may be mentioned. Spoons and forks are made from 2 parts copper, 1 nickel, 1 zinc; knife and fork handles from 5 copper, 2 nickel, 2 zinc, a mixture closely resembling alloyed silver; addition of lead produces an alloy which appears well fitted for casts, and for making candlesticks, &c.; iron or steel, on the other hand, makes the alloy whiter, harder, and more brittle. German silver is harder than silver, and takes a high polish. It melts at a red heat, the zinc being volatilized in the open air. It is attacked by the strong acids, but it is also affected by common organic acids, such as vinegar, and by some saline solutions.

German Tinder, or AMADOU, is prepared from the *Bolĕtus fomentarius*, a fungus growing on the oak, birch, and some other trees, or from the *Bolĕtus igniarius* found on the willow, cherry, plum, and other trees. The fungus is removed with a sharp knife, washed, boiled in a strong solution of saltpetre, beaten with a mallet, and dried. In surgery it is sometimes used to stop local bleeding.

Germantown, a northern suburb of Philadelphia, pleasantly situated on high ground, and containing numerous elegant residences. Here the British, under General Howe, defeated the Americans under Washington, 4th Oct. 1777.

Germany (Latin, *Germania;* German, *Deutschland;* French, *Allemagne*), the name given collectively to the states in Central Europe which constitute the German Empire. The limits of Germany have varied greatly at different times; and at present there are large numbers of people Germans in race and language not included within the boundaries of the empire, many being natives of Austria and Switzerland. On the other hand, the political boundaries of Germany contain several millions of Slaves, Lithuanians, Poles, &c. As one of the Teutonic peoples the Germans are akin by race to the Dutch, English, and Scandinavian peoples. The capital of Germany is Berlin; other large towns are Hamburg, Breslau, Munich, Dresden, Leipzig, Cologne. As each state is described under its own name, the description given below is confined to leading features which belong to Germany as a whole. The following table shows the component parts of the empire:—

	Area in sq. miles.	Pop. June 14, 1895.
KINGDOMS.		
1. Prussia	134,506	31,491,209
2. Bavaria	29,283	5,773,836
3. Würtemberg	7,530	2,071,407
4. Saxony	5,788	3,753,372
IMPERIAL TERRITORY.		
5. Alsace-Lorraine	5,600	1,621,279
GRAND-DUCHIES.		
6. Baden	5,824	1,713,844
7. Hesse	2,965	1,031,791
8. Mecklenburg-Schwerin	5,080	606,617
9. Mecklenburg-Strelitz	1,130	103,373
10. Oldenburg	2,479	369,754
11. Saxe-Weimar	1,390	339,106
DUCHIES.		
12. Brunswick	1,424	435,625
13. Saxe-Meiningen	953	232,818
14. Saxe-Coburg and Gotha	755	217,591
15. Saxe-Altenburg	511	178,719
16. Anhalt	885	292,457
PRINCIPALITIES.		
17. Waldeck	433	61,128
18. Lippe	469	123,515
19. Schaumburg-Lippe	130	41,148
20. Schwarzburg-Rudolstadt	362	89,492
21. Schwarzburg-Sondershausen	332	77,589
22. Reuss (elder line)	122	66,641
23. Reuss (younger line)	318	129,102
FREE TOWNS.		
24. Bremen	98	191,624
25. Hamburg	160	662,514
26. Lübeck	115	82,813
	208,626	51,758,364

Physical Features.—Germany, as regards its surface, may be divided into three different regions. Farthest south is the Alpine region along the southern frontier, comprising parts of Bavaria, Würtemberg, and Baden lying next to Austria and Switzerland. North of this the Suabian-Bavarian plateau extends to the mountain region of Central Germany, where the chain known as the Fichtelgebirge is continued east by the Erzgebirge and the Riesengebirge, forming the boundary next Austria; west by the Thüringerwald, Rhöngebirge, and Spessart; farther north lie the Harz Mountains. The great plain in the north extends without interruption to the German Ocean and the Baltic. Germany is remarkably well watered. Its central mountain region and plateau forms part of the great water-shed of Europe. The Danube proceeds across it in an eastern direction, and the Rhine, though it neither rises nor ter-


GERMAN EMPIRE
BY J. BARTHOLOMEW, F.R.G.S.
British Miles
Kilometres
Railways
Longitude East 14 from Greenwich
NORTH SEA
BALTIC SEA
DENMARK
SWEDEN
Zealand
Funen
North Frisian Islands
East Frisian Is.
Kiel Bay
Danzig Bay
Pomeranian Bay
HOLSTEIN
HANOVER
OLDENBURG
MECKLENBURG
POMERANIA
BRANDENBURG
BERLIN
POSEN
WEST PRUSSIA
EAST PRUSSIA
SILESIA
SAXONY
WESTPHALIA
HESSEN
RHINE PROV.
BAVARIA
WURTEMBERG
Palatinate
Franconia
Swabia
Bohemia
Moravia
Galicia
POLAND
AUSTRO-HUNGARY
Austria
Tyrol
SWITZERLAND
BELGIUM
HOLLAND
FRANCE
RUSSIA
Zuyder Zee
WARSAW
VIENNA
PRAGUE
CRACOW
Danube
R. Vistula

minates within Germany, flows within it for the greater part of its course. After these come the Elbe, Oder, Vistula, Weser, Main, Neckar, Mosel, Ems, and Eider—all of them navigable. Germany possesses much and varied mineral riches, the most important minerals being common coal and brown coal, iron, zinc, lead, and salt. Tin, quiksilver, antimony, sulphur, marble, kaolin, asbestos, freestone, &c., occur in various localities. Germany is likewise extremely rich in mineral waters, especially in the southern parts. Though the country extends over 8½° of latitude, its mean annual temperature is remarkably uniform. This is owing mainly to the different elevations of the surface, the low plains of the north having a higher, while the hills and plateaux of the south have a lower temperature than their latitudes might seem to indicate. The mildest climate is enjoyed by the valleys of the Rhine and the Main.

Agricultural Products, &c.—These are varied and numerous. With exception of the loftier mountain districts, where the surface is fit only for pasture, the growth of all the ordinary cereals is universal. Potatoes, hemp, and flax also form most important crops, and in many parts sugar-beet, tobacco, and hops are cultivated on an extensive scale. Wine is produced in many districts. The cultivation of the vine diminishes in importance from south-west to north-east, but is carried on to some extent even in the Prussian provinces of Saxony, Brandenburg, and Posen. The forests are of great extent and value, particularly in the mountain districts. The central plateau is more sparingly wooded, but the eastern part of the north plain has extensive forests. Among domestic animals, the horned cattle of the districts along the North Sea and the Baltic, the sheep of Saxony and Silesia, and the swine of Westphalia have long been famous. The horse, except in Schleswig-Holstein, East Prussia, Mecklenburg, and some other parts, appears to be much neglected. Game is very abundant, and includes, in addition to the smaller kinds, the stag, boar, and wolf. Fish are numerous, both in the rivers and lakes.

Manufactures.—Linens are made in every part of Germany, but more especially in Westphalia, Silesia, Bohemia, and Saxony; woollens in the Prussian provinces of the Rhine, Saxony, Brandenburg, and Silesia, in the kingdom of Saxony, and in Alsace; the cotton manufacture constitutes the chief manufacturing industry in Alsace-Lorraine, the kingdoms of Saxony and Würtemberg, and the grand-duchy of Baden, and flourishes in Bavaria, Prussia, and other parts; the silk manufacture flourishes in the Rhine provinces and in Baden; iron manufactures are carried on in most of the states, but principally in Prussia, Alsace-Lorraine, Bavaria, and Saxony; steel is largely manufactured in the Rhine provinces. The manufactures of beet-root sugar, of leather, of metals, porcelain, glass, fancy flowers, hats, musical instruments, watches, clocks, wooden wares, including toys, &c., are likewise important; and breweries and distilleries are to be met with everywhere.

Commerce.—The commerce is very extensive, and is administered and guided by special laws of a union called the Zollverein or Customs Union, which embraces the whole of Germany and also the grand-duchy of Luxemburg. The exports and imports comprise a great variety of manufactured goods and raw products. The manufactures of Germany are now sent to all parts of the world, and in various places there is a strong competition between German and British goods. The staple exports to Britain are agricultural produce, sugar, provisions, timber, &c. In return Britain sends to Germany cotton and woollen goods, machinery and metals, herrings, coal, &c. In 1899 the total imports of Germany were £289,000,000, and the exports, £218,000,000. In 1899 the merchant navy contained 3713 ships of 1,639,552 tons burden, of which 1223 were steamers, having a tonnage of 1,038,391. By far the principal seaport is Hamburg; others are Bremen and Bremerhaven, Stettin, Königsberg, Danzig, Lübeck, &c. The total length of railways is about 28,000 English miles, five-sixths of which are state railways. By the law of Dec. 4, 1871, a uniform gold standard was introduced for the monetary system of the whole German Empire. The denominational unit is the *mark*, nearly equal to 1*s*. of British money and divided into a hundred *pfennige*. Since 1872 the French metrical system of weights and measures has been in force throughout the German Empire. See *Decimal System*.

Finances.—The revenue is derived principally from the customs duties collected throughout the Zollverein, from excise duties on beet-root sugar, salt, tobacco, and malt, and from the contributions made by each state in proportion to its population. According to the budget for year ending March

31, 1896, the revenue would amount to £61,238,870, of which customs and excise were estimated to yield £31,000,000. The chief item in the expenditure is on military administration, amounting to about £23,000,000. The estimate for the navy was £2,800,000. The debt of the empire is of no great amount.

Constitution.—The constitution of the German Empire is based upon the decree of the 16th of April, 1871, which took effect on the 4th of May following. The presidency of the empire belongs to the crown of Prussia, to which is now attached the title of *German Emperor* (*Deutscher Kaiser*). The prerogatives of the emperor are to represent the empire in its relation to other states, to declare war if defensive, and conclude peace in name of the empire, to contract alliances, &c. The emperor has also the supreme command of the army and the navy, appoints and dismisses officials of the empire, appoints consuls, and superintends the entire consulate of the empire. The legislative authority is vested in the Bundesrath (Federal Council) and the Reichstag (Imperial Diet) the former consisting of 58 representatives of the different states of the empire, namely, 17 from Prussia, 6 from Bavaria, 4 each from Saxony and Würtemberg, 3 each from Baden and Hesse, 1 each from Saxe-Weimar and others. The Reichstag consists of 397 deputies elected by ballot and universal suffrage in all the states of the empire. On the average one member is returned to the Reichstag for every 124,500 of the inhabitants.

Army and Navy.—Service in the army or navy is obligatory on every man in Germany who is not morally or physically unfit, and no substitution is allowed. Liability to serve begins from the completion of the seventeenth year, but as a rule, the six years' service required in the standing army (seven in the cavalry and field artillery) is from the twentieth to the twenty-seventh year. Two of the six years (or three as the case may be) must be spent in active service, and the remaining four in the reserve. After quitting the army of reserve the next five years are passed in the first-class of the Landwehr, and seven in the second. All able-bodied men, from seventeen to forty-five, who are not in the line, the reserve, or the Landwehr, must belong to the Landsturm, which is called out only in case of invasion of the territory of the empire. Educated young men above seventeen years of age who volunteer for active service, and equip and maintain themselves during their service, are admitted into the reserve after one year's continuous service. The peace strength of the army is about 584,000 men, and the total war strength of trained soldiers 3,000,000. In 1895 the German navy consisted of 13 battle-ships, 12 port defence ships, 43 cruisers (9 of the first class and 11 of the second), besides torpedo craft, &c.

Religion and Education.—At the census of 1890 the German Empire contained 31,026,810 Protestants, 17,674,921 Catholics, 145,540 Christians of other denominations, and 567,884 Jews. Education is compulsory throughout Germany. Every commune or parish must support at its own cost a primary school. Every town in addition must maintain one or more middle schools, which supply a higher education than the elementary schools. Above these are *real schools* (*Realschulen*) giving a still higher education, nearly corresponding to what is called the *modern side* in Great Britain; institutions of similar standing called *gymnasiums*, giving an education in which the ancient languages form a more important element; and, above all, the universities, of which there are 21 in the country, the chief being those of Berlin, Leipzig, and Munich. The Germans as a whole are perhaps the best-educated people in the world.

History.—The date of the first arrival of the Germanic or Teutonic races in Europe is unknown. At the close of the 2nd century B.C. Germanic tribes called Cimbri and Teutones left their homes in the Danish peninsula, and descending upon Italy were defeated by Marius at Aquæ Sextiæ (Aix in Provence) and Vercellæ in Northern Italy. The Romans did not come again in contact with the Germans till Cæsar's invasion of Gaul brought on a contest with the Suevian prince Ariovistus (58 B.C.). At that time several German tribes had crossed the Rhine and settled in the district between that river and the Vosges Mountains, while others had pushed their way through what is now Belgium. The Germans on the left bank of the Rhine were soon subjugated, and two expeditions were made by Cæsar across the Rhine. Under Augustus a systematic attempt was made to subjugate the vast and little-known region Germania, extending between the Rhine and the Vistula, and from the Danube to the North Sea. Tiberius reduced all the tribes between the Rhine and the Elbe, but a few years later there was a

revolt, in which three Roman legions under Varus were annihilated by Arminius, leader of the Cherusci, about 9 A.D. The attempt to subjugate the Germans was given up by Augustus; and Germanicus, although he avenged the defeat of Varus by a succession of campaigns, failed to recover the Roman ascendency. About this time each tribe or nation among the Germans is described as having been divided into four classes:—1. The nobles, from whom the kings and chiefs of the districts were chosen. 2. The freemen, who, with the nobles, had the right to choose their residence and hold heritable property, who formed the chief strength of the armies and voted in the popular assemblies. 3. The freedmen, a middle class between freemen and slaves, had no landed property, but farmed the land; they were not admitted to the popular assemblies. 4. The slaves, who were entirely in the power of their masters. In religion the Germans were polytheists. Among their great gods were Woden (or Odin), Donar (Thor), Thiu (Tyr), Frigga, &c. They erected no temples and had no idols, but believed in a future life and in eternal justice.

As the aggressive force of the Roman empire abated, it continued to be more and more subject to the incursions of the Germans, who by the end of the 5th century had overrun Gaul, Italy, Spain, and part of Africa. After this Germany itself continued in a divided state till it came under the single rule of Charlemagne. (See *France.*) The history of the German empire properly commences with the Treaty of Verdun (843 A.D.), which separated the land of the Eastern Franks under Ludwig the German from that of the Western and Central Franks. Out of Ludwig's kingdom was developed the German nationality. Charles the Fat became emperor in 881, and three years later was also elected king of the West Franks, thus again uniting under one sceptre the Monarchy of Charlemagne. After his deposition in 887 the two territories of the Eastern and Western Franks were again separated, the former electing Arnulf as their king. He died in 899, and was succeeded by his infant son Louis, who was proclaimed King of Lorraine in 900, assumed the title of emperor in 908, and as such is designated Louis IV. He died in 911, and the German nations chose Conrad, count or duke of Franconia, as his successor. He died in December, 918, of a wound received in battle with the Huns. In 919 Henry the Fowler, duke of Saxony, was elected. He was succeeded by his son Otto the Great in 936, who revived the empire of Charlemagne, receiving the crown of Holy Roman Empire from the pope in 962. He died in 973, and was succeeded by his son Otto II., who had been crowned emperor by the pope in his father's lifetime. Henry II., duke of Bavaria, surnamed the Saint, the hereditary heir of the Saxon line, was elected at Mainz, on the death of Otto in 1002, crowned emperor in Rome 1014, and died in 1024. With him ends the Saxon line of emperors.

Conrad II., surnamed the Salic, a Franconian nobleman, was chosen to succeed him. He spent several years in Italian wars, defeated the Poles, and restored Lusatia to the empire. He died in 1039. He was succeeded by his son Henry III., who had been chosen in his lifetime, and who, the imperial power being now at its highest point, exercised more despotic authority in Germany than any of his predecessors. The fruits of his policy were lost by his son Henry IV. (1056–1106), who was passionate and weak. In his reign occurred the famous quarrel with the pope regarding investitures, which ended in Henry having to humble himself before the pope at Canossa. His life was embittered by contests against rival emperors, and latterly by the defection of his own son Henry to the Papal party, by whom he was eventually deposed. Henry V. (1106–25) inherited, however, the quarrel of the investitures, took Pope Paschal II. prisoner, and was excommunicated by seven councils. At length the question of investiture was settled by the Concordat of Worms (1122). On his death there was a contested election and a civil war between Lothaire, duke of Saxony, and Conrad of Hohenstaufen, in which the former was successful.

A contest was now begun between the Saxon and Hohenstaufen (Suabian) families, in which the celebrated party names Guelf and Ghibelline originated. On the death of Lothaire in 1138 Conrad III. (of Hohenstaufen) was chosen to succeed him. Conrad died in 1152, and was succeeded by his nephew Frederick Barbarossa (which see). His son Henry VI. began his reign with a war in Southern Italy. He conquered Sicily, and was crowned king of it in 1194. He died at Messina in 1197. Philip, brother of Henry, and Otto IV., were elected by rival factions in 1198.

Philip, who was successful, was assassinated in 1208. Otto IV., the son of Henry the Lion, was recognized by the Diet of Frankfort in 1208 as the successor of Philip. He attempted the conquest of the Two Sicilies without success, and died in 1218. Frederick II., king of the Sicilies, was elected emperor in 1212. His life passed in contentions with the popes and the Lombard cities. He died in 1250. Conrad IV., his son, had to contend against William of Holland. He died in 1254. He was the last emperor of the house of Hohenstaufen, which became extinct on the death of his son. His successor, William of Holland, was slain in Friesland in 1256. Richard, earl of Cornwall, and Alfonso X., king of Castile, were chosen emperors in 1257; but the internal divisions of Germany had already deprived the office of all authority, and neither of them had any power. Until 1273 the German Empire had no real head.

Rudolph, count of Hapsburg and Cyburg, the most powerful prince in Helvetia, was chosen emperor (1272). He enriched his own family by his victories over the King of Bohemia, and acquired Austria, Styria, and Carinthia as imperial fiefs for his sons Albert and Rudolph. He died in 1291. Adolphus of Nassau, his successor, was deposed in 1298 by the Diet of Mainz. Albert I., son of Rudolph, was chosen emperor the same year. He is chiefly celebrated for his wars with the Swiss as Duke of Austria, which led to the independence of Switzerland. He died in 1308, and was succeeded by Henry VII. of Luxembourg, nearly the whole of whose reign was passed in Italy, where he died in 1313. In 1314 a double election took place, Frederick, duke of Austria, sometimes called Frederick III., was elected along with Louis of Bavaria. On the death of Frederick in 1330 the latter became sole emperor. He died excommunicated and deposed in 1347. Charles IV., king of Bohemia, was elected in 1346. His reign is chiefly distinguished for the Golden Bull (1356) regulating the electorate. (See *Golden Bull.*) He died in 1378. Wenceslaus, his son, was deposed for his excesses in 1400. Rupert, count palatine, elected 1400, possessed little authority. Sigismund, king of Hungary and Bohemia, son of Charles IV., was elected by a party in 1410. His reign is distinguished by the commencement of the Reformation in Bohemia, by the Council of Constance, and the condemnation of Huss and Jerome. He died in 1437. Albert II. (V. of Austria) was elected in 1438, and died in 1439. He was succeeded by Frederick III., duke of Styria and Carinthia. He was the last emperor who was crowned in Rome. Henceforth the German emperors were always of the house of Austria. He died in 1493. His son Maximilian I. succeeded. During his reign the diet of Cologne was held, which divided the estates of the empire into ten circles for the better maintenance of the public peace.

Since its rise the empire had undergone many changes. At the extinction of the Carlovingian dynasty Germany was divided into five nations or dukedoms—Franconia, Suabia, Bavaria, Saxony, and Lorraine. Henry the Fowler and the Ottos added the marches of Austria and Misnia; Henry the Lion and Albert of Brandenburg, Mecklenburg and Pomerania. The house of Austria added Styria, Carinthia, Carniola, and the Tyrol. But Switzerland had been lost, and the old Burgundian territories of the empire, Franche Comté, the Lyonnais, and Provence, had gone to consolidate the French monarchy under Louis XI. Bohemia and Hungary, and many of the Italian cities, especially in the north, were also connected with the empire, but the connection was more formal than real, and the circles established by the Diet of Cologne (1512) represented at that time the estates of the empire, viz.: 1. Austria, 2. Bavaria, 3. Swabia, 4. Franconia, 5. the Upper Rhine (Lorraine, Hesse, &c.), 6. the Lower Rhine, or the Electorates (Mainz, Trier, Cologne), 7. Burgundy (Netherlands), 8. Westphalia, 9. Lower Saxony (Brunswick, Lüneburg, Lauenburg, Holstein, &c.), 10. Upper Saxony (Saxony, Brandenburg, Pomerania, &c.).

The chief political machinery of the empire was connected with the diet. The exact constitution of the early German diets is not known. In the 12th century the counts of the empire became distinguished from the princes, and lost the right of voting in the diets. The election of an emperor was at first undertaken by the whole diet. In the 13th century the number of electors was restricted to seven, to which two more were afterwards added. (See *Elector.*) The diets were called by the emperor at his own pleasure, but as they had the power of granting supplies their meetings were frequent; and as their authority over the different states was partial, and their

policy could only be carried out by the executive force of the emperor, they can hardly be regarded as an independent power in the state. Neither the time nor the place of meeting of the diets was at first fixed. From an early period the cities of Germany were represented in the diet. In early times they generally supported the authority of the emperor, as their interest was common with his in diminishing the power of the greater vassals. Municipalities were at first established about the reign of Frederick I., and soon began to assert their independence. The predatory habits of the nobles, besides the claims of superiority over entire cities or particular citizens asserted by the princes, involved the cities in continual warfare with the feudal nobility, and often also with their ecclesiastical superiors. The necessity of defending their privileges compelled them to enter into leagues among themselves. Among the earliest of these combinations was the Hanseatic League, formed to resist both the oppression of rulers and the depredations of land and sea robbers. A league was formed in 1255 by more than sixty cities of the Rhine, headed by the three ecclesiastical electors, to resist the depredations of the lesser nobles. The Suabian League, formed in 1376, was of similar origin. These leagues were met by counter associations of nobles and princes.

Maximilian, who succeeded to the empire in 1493, was succeeded in 1519 by his grandson Charles V. (See *Maximilian I.*, *Charles V.*) The reign of Charles, the most important in the German annals and the most brilliant in the 16th century, was divided among three great conflicts—the continued struggle between France and Germany, the conflict with the encroaching Ottoman empire, and that with the Reformation. In 1556 Charles resigned the empire to his brother Ferdinand. The Council of Trent was concluded in Ferdinand's reign. He died in 1564. Then followed Maximilian II., Rudolph II., Matthias, and Ferdinand II. By this time was begun a religious war, by which Germany was devasted for thirty years, hence called the Thirty Years' war.

The invasion of Germany by Christian IV. of Denmark in 1625, the Peace of Lübeck (1629), the invasion of Gustavus Adolphus (1630), the battles of Leipzig in 1631, of the Lech and Lützen in 1632, of Nördlingen in 1634, the war with France in 1635, belong to the history of the Thirty Years' war (which see). Ferdinand died in 1637, and was succeeded by his son Ferdinand III. Ferdinand III. had gained a military reputation by the battle of Nördlingen, but Banér, Bernhard of Saxe-Weimar, Torstenson, Turenne, and the Great Condé gained repeated victories over his troops. He was at length induced to enter into negotiations; and the Thirty Years' war was concluded by the Peace of Westphalia (24th October, 1648), in which the policy of France and Sweden was triumphant. The principal conditions which concerned Germany were a general amnesty and restoration of rights. France received definitively the bishoprics of Metz, Toul, and Verdun, with Breisach, Upper and Lower Alsace, and ten imperial cities in Alsace. Sweden received Rügen, and Hither Pomerania and part of Farther Pomerania, with some other territories. Greater power was given to the Protestants; and the right of the princes and states to make war and alliances among themselves or with foreigners was recognized.

The emperor died in 1657. His son Leopold I. was elected emperor in 1658. The success of Louis XIV. in his invasion of Holland led to a coalition against him, in which the emperor joined (1673). The war was continued for some years, and terminated by the Peace of Nimeguen, 1679. The League of Augsburg, in which the emperor joined, led to a protracted war with France, which was concluded by the Peace of Ryswick. In 1692 the emperor erected Hanover into an electorate, and in 1700 he permitted the Elector of Brandenburg, Frederick III., to take the title of King of Prussia. The war of the Spanish Succession, in which Great Britain, Holland, and the empire were leagued against France, was begun in 1702. To it belong the victories of Marlborough and Eugene (Blenheim, Oudenarde, Malplaquet). The Emperor Leopold died in 1705. He was succeeded by his son, Joseph I., who died in 1711. Joseph was succeeded by his brother, Charles VI. (See *Charles VI.*) The alliance against France was dissolved by the Peace of Utrecht in 1713, to which the emperor refused to accede, and was left alone against France. After a brief campaign between Prince Eugene and Villars he acceded to the Treaty of Rastadt, negotiated between these commanders, 7th March, 1714. The Spanish Netherlands, and Naples, Milan, Sardinia, and other Italian conquests were left to the

emperor. Having no male heirs Charles had promulgated in 1713 the Pragmatic Sanction, regulating the succession to his hereditary dominions in favour of his daughters in preference to those of his brother, Joseph I. He died in 1740. Charles Albert, elector of Bavaria, son-in-law of Leopold I., got himself chosen emperor (as Charles VII.) in 1742. He laid claim to the hereditary possessions of the House of Austria, and entered into an alliance with France, Spain, Prussia, &c., against Maria Theresa, daughter of Charles VI. But he died in 1745, and Francis I., grand-duke of Tuscany, the husband of Maria Theresa, was elected emperor; thus the house of Hapsburg-Lorraine, which had succeeded to the hereditary possessions of Austria, was recognized as the head of the empire. After a brief interval took place the Seven Years' war (1756–63), in which Austria, Russia, France, and Saxony combined against Prussia, then ruled by Frederick the Great. The Peace of Hubertsburg (15th Feb. 1763) concluded the war, Prussia retaining her acquisitions. In 1765 Joseph II. succeeded to the imperial crown, becoming at the same time co-regent with his mother of the Austrian hereditary dominions. He joined with Russia and Prussia in the first partition of Poland (1772). He was succeeded by his brother Leopold, who, having died in 1792, was succeeded by his son, Francis II. He joined in 1793 in the second partition of Poland. He took the command of his army against the French in 1794, concluded the Peace of Campo Formio with Bonaparte (17th October, 1797); joined the second coalition against France in 1799, and concluded the Treaty of Lunéville (3d February, 1801); joined the third coalition in 1805, and concluded the Treaty of Presburg (26th December, 1805). In 1804 Francis took the title of hereditary Emperor of Austria, renouncing two years later that of head of the German Empire, which, indeed, had ceased to exist, owing to the conquests of Napoleon.

The States of Germany were again united by the Treaty of Vienna (1815), in a confederation called the German Confederation (der Deutsche Bund). In 1818 a general commercial league, called the Zollverein, was projected by Prussia, and was gradually joined by most of the German states, exclusive of Austria. Revolutionary outbreaks caused great disturbances in various German states in 1830 and 1848, particularly the latter. The German diet was restored in 1851 by the efforts of Prussia and Austria, who were latterly rivals for the supremacy in the confederation. In 1866 the majority of the diet supported Austria in her dispute with Prussia respecting the disposal of the duchies of Schleswig and Holstein, whereupon Prussia withdrew from the confederation and declared it dissolved. The Seven Weeks' war between Austria and Prussia ended in the defeat of the former, the loss of her Italian possessions, and her exclusion from the German Confederation, which was re-formed by Prussia under the title of the North German Confederation. After the Franco-German war (which see), in which the South German States, as well as the North German Confederation, supported Prussia, the King of Prussia was proclaimed German Emperor at Versailles on 18th January, 1871. The parliament of the new German Empire met at Berlin on 21st March, and adopted the new constitution. Since the unity of the empire was attained endeavours have been made to establish a colonial empire, principally in Africa. In Polynesia Germany has acquired a portion of New Guinea, the chief Samoan islands, and other groups. In recent years the manufacturing industries and foreign trade of the empire have developed greatly, and the present emperor (William II.) is bent on making Germany a naval power.

German Language.—German is one of the Teutonic family of languages, of the Aryan or Indo-European stock, and hence is a sister tongue with Gothic, Anglo-Saxon and English, Dutch, Danish, Swedish, and Icelandic. Of these the Gothic, now long extinct, presents us with the earliest specimens of any Teutonic speech that we possess in the fragments of a translation of the Bible made by Bishop Ulfilas about A.D. 360. Anglo-Saxon comes next; German follows somewhat later. The German dialects spoken in the lower and more northern localities have long exhibited considerable differences from those spoken in the higher and more inland, thus giving rise to the distinction between High German and Low German. What is ordinarily called German (called *Deutsch* by the Germans) is High German. Low German includes Dutch, Frisian, &c. One of the earliest specimens of Old High German is the oath of Charles the Bald, sworn at Strasburg in 842. Middle High German became literary in the 12th century, its poetry giving it a predominance as far as Austria. During the

following century Suabian was the predominant dialect, and its influence is apparent in all the writings of the 14th and 15th centuries. Ultimately Upper Saxon became the language of literature and cultivated society in consequence of the translation of the Bible by Luther, which may be said to have fixed the New High German of modern times.

German Literature received its first impulse from the fondness of the early Germanic races for celebrating the deeds of their gods and heroes. According to Tacitus the warriors would advance to attack chanting wild war-songs, with their shields held close to their mouths, which added to the discordant effect of the unknown and uncouth tongue. Of these early songs nothing even in a translated form has been handed down to us. The legends immediately connected with the Gothic, Frankish, and Burgundian warriors of the period of national migration — Dietrich (Theodoric), Siegfried, Hildebrand, &c. — have for the most part some historical foundation, and many of them were eventually incorporated in the Nibelungenlied, the most celebrated production of German mediæval poetry. On the introduction of Christianity was opened another sphere of literary activity. Metrical translations of the Evangelists, the Krist and Heliand, appeared in the 9th century in the High and Low German dialects respectively. The Ludwigslied, a pæan in honour of the victory of Louis III., king of the Franks, over the Normans in 883, was composed in Old High German by a Frankish ecclesiastic. The preservation of the Hildebrandlied is also due to churchmen, who transmitted it partly in the High and partly in the Low dialect. The Merseburger Gedichte, two songs of enchantment written in the 10th century, throw light on the ancient religious beliefs of Germany; but in general the hostility of the clergy to the old pagan literature of heroic legends, beast-fables, &c., was not favourable to its preservation.

In the 12th and 13th centuries poetry passed from the monasteries and ecclesiastical schools to the palaces of princes and the castles of nobles. Under the cultured emperors of the house of Hohenstaufen, the first bloom of German literature came. Many of the poets of this period were nobles by birth, some of them even princes. Heinrich von Weldeke was the first to introduce into his heroic poem Eneit that spirit of devotion to women called by the old Germans *Minne* (Love, hence the name *Minnesänger*, Love-Minstrel). A still greater name is that of Wolfram von Eschenbach, the author of Parzival, a poem embodying the legends of King Arthur, the Knights of the Round Table, and the San Graal (Holy Grail). These traditions, together with the exploits of Charlemagne, of Alexander the Great, and the Trojan heroes, inspired also the lays of Gottfried of Strasburg, Hartman von der Aue, and others. These subjects were all taken from the romances of the French *trouvères*, and treated in a style closely resembling theirs. But we have besides real national epics in the Nibelungenlied and Gudrun. (See *Nibelungenlied*, *Gudrun*.) The lyrics or minnesongs of this period are not less remarkable than its romances and epics Perhaps the most gifted lyrist is the celebrated Walther von der Vogelweide. Next to him rank Heinrich von Ofterdingen, Reinmar der alte, the Austrian poets Nithard and Tannhäuser. Several hundreds of these poets were engaged in travelling from palace to palace and from castle to castle. Their songs were mostly in the Suabian dialect, and the poets constituted what is called the Suabian school. In the 13th century didactic poetry began to be cultivated with some success. The dawn of historical literature is heralded by the chronicles of Limburg (1336–98) and of Alsace (1386), but the age of chivalry, as Ulrich von Lichtenstein complained in his poem Frauendienst, was declining. During the troublous times of the Interregnum (1256–73) poetry passed to the homes of the private citizen and the workshops. These plebeian songsters formed themselves into guilds in the imperial cities — Nürnberg, Frankfort, Strasburg, Mainz, &c., and were called *Meistersänger*, in contradistinction to the knightly *Minnesänger*.

In the 14th century Germany produced several mystical theologians, disciples of Meister Eckhart, the most celebrated of whom were Tauler and Suso, whose sermons and writings paved the way, in some measure, for the Reformation. The only good poetry in the 14th, and up to the close of the 15th century, were the spirited lays of Halb Suter and Veit Weber, who celebrated the victories of Switzerland over Austria and Burgundy. The invention of printing caused an increasing literary activity, and the works printed in Germany between 1470 and 1500 amounted to several thousand

editions. In 1498 there was published the celebrated beast-epic Reineke Vos (Reynard the Fox). Other popular works were the Narrenschiff (Ship of Fools) of Sebastian Brandt, an allegorical poem in which the vices are satirized; The Satires of Thomas Murner; and (in 1519) Till Eulenspiegel, a collection of humorous stories about a wandering mechanic.

In the 16th century a new era opens in literature with Luther's translation of the Bible. The writings of Luther, Zwingli (1484–1531), Sebastian Frank (1500–45?), Melanchthon (1497–1560), Ulrich von Hutten (1488–1523), one of the chief writers of the Epistolæ Obscurorum Virorum, constitute the principal theologic literature of the Reformation. History was now written in a superior style, and with greater comprehensiveness, by Frank in the Zeitbuch and Weltbuch, and by Sebastian Münster (1489–1552) in his Kosmographie; also by Tschudi (1505–72) in Chronicles of Switzerland, and by Aventinus (1477?–1534), the Bavarian chronicler. The autobiography of Götz von Berlichingen also deserves mention as a sketch of the rude lives of the smaller nobility. Amongst the poets of this period Hans Sachs (1494–1576), the cobbler of Nürenberg, the greatest of the Meistersänger, and Johann Fischart (died 1589), a great satirist, and author of Das glückhafte Schiff, stand much above their contemporaries. Many of the hymns and religious lyrics of the age are of high merit, particularly those of Luther, Eber, Waldis, and others. The drama also made considerable progress, Hans Sachs, before mentioned, and Jakob Ayrer (died 1605) being amongst the best writers in this department. But it was in learned and scientific treatises that the age was most prolific. Amongst the chief names in this respect are Luther, Camerarius, Cornelius Agrippa, Paracelsus, Copernicus (astronomy), Leonhard Fuchs (botany and medicine), Conrad Gesner (zoology and classics), and Agricola (mineralogy).

By the beginning of the 17th century literature was on the decline. This century is known in German literature as the period of imitation. Most of the poets were graduates of universities; and learned societies were formed for the purpose of improving the language and literature. A new school of poetry, known as the first Silesian school, was founded, of which Martin Opitz (1597–1639) was the leader. His works are more remarkable for smoothness of versification than for true poetic inspiration. As a critic his work Die Deutsche Poeterie became a kind of manual for verse makers. Amongst the chief members of the Silesian school were Simon Dach (1605–69), Von Zesen (1619–89), Johann Rist (1607–67), and, greatest of all, Paul Fleming (1609–40), whose lyrics are natural and cheerful as the songs of a lark. Of this school also was Andreas Gryphius (1616–64), who may be said to have founded the regular German drama. The second Silesian school, headed by Hoffmann von Hoffmannswaldau (1618–79), and Lohenstein (1635–83), carried affectation to its utmost. Both the Silesian schools were opposed by the 'court poets,' Canitz (1654–99), Besser (1654–1729), and many others who imitated the French school and took Boileau for their guide. Germany's greatest hymn-writer, Gerhardt (1606–75), belongs to this period. Amongst the best satirists and epigrammatists were Logau (1604–55) and Lauremberg (1591–1659). Amongst novelists Moscherosch with his Geschichte Philanders von Sittewald, and Grimmelshausen in his Simplicissimus give graphic pictures of life during the Thirty Years' war. Among the scientific and philosophic writers of the period we may mention Kepler (1571–1631), Puffendorf (1632–94), the publicist; and Jakob Böhme (1575–1624), the great mystic who stood almost alone in using the vernacular in communicating philosophical instruction. Leibnitz (1646–1716) was the first to lay a scientific basis for the study of philosophy, but his works were composed chiefly in French and Latin. Wolff (1679–1754), his disciple, shaped the views of his master into a comprehensive system, and published his works in the German language.

In the 18th century poetry revived with Haller (1708–77), remarkable as a descriptive poet, and Hagedorn (1708–54), a lyrist of considerable merit. The Saxon school headed by Gottsched (1700–66) aimed at a reformation of German poetry in the direction of French clearness and correctness, modelling the drama as far as possible on the works of Corneille and Racine. These tendencies brought about a violent controversy with a group of writers in Zürich, known as the Swiss school, and headed by Bodmer and Breitinger, who took the English poets as their model, and laid stress on the function of imagination and feeling in poetry. The result of the controversy was that most of the young writers at Leipzig shook off the authority of Gottsched, and even established

a periodical (The Bremer Beiträge) in which the principles of their former master were attacked. Among the contributors were Rabener (1712–91), a popular satirist with a correct and easy style; Zachariä (1726–77), a serio-comic epic poet; Gellert (1715–69), the author of numerous popular hymns, fables, and a few dramas now forgotten; Kästner (1719–1800), a witty epigrammatist and talented mathematician; Giseke, Cramer, Fuchs, Ebert, and many others of more or less note. To the school of Halle belonged Kleist (1715–59), Gleim (1719–1803), a celebrated fabulist, and others. Gessner of Zürich (1730–87) gained in his time a high reputation as a writer of idyls. With the writings of Klopstock (1724–1803) and Wieland (1733–1813) the classical period of German literature (usually reckoned from 1760) may be said to begin. Though the epic poem of the first (Messias) is no longer counted a poem of the first rank, yet Klopstock's work, with its ardent feeling for the spiritual and sublime, is recognized to have had a beneficent effect on German literature. Wieland, a striking contrast to Klopstock, awakened with his light and brilliant verse a greater sense of gracefulness in style. But it was reserved for Gotthold Ephraim Lessing (1729–81) to give a new direction to German literature. He established a new school of criticism and dealt the fatal blow at French influence. His tragedy, Emilia Galotti, his comedy of Minna von Barnhelm, and his philosophic drama Nathan der Weise, were the best models of dramatic composition which German literature had yet produced, and his direction of the German mind towards Shakspere and the English drama was not the least of the many impulses he contributed to the literary growth of his countrymen. Herder (1744–1803), with his universal knowledge and many-sided activity, followed Lessing as another great influence in the literary world. The researches of Winckelmann (1717–68) in ancient sculpture led to a new understanding of art, as those of Heyne in ancient literature mark the development of modern German scholarship. A union of the students at Göttingen University, where Heyne taught, gave rise to the *Göttinger Dichterbund* or *Hainbund*, among the members of which were Gottfried Aug. Bürger (1748–94), author of Lenore and other wild and picturesque ballads and songs; Voss (1751–1826), the translator of Homer, and author of one of the finest German idyls, Luise; together with the two brothers Stolberg, Boie, Hölty, Claudius, &c.

This period was followed by a time of transition and excitement known in Germany as the *Sturm-und-Drang Periode* (Storm and Stress period), which found its fullest expression in an early work of Goethe's (1749–1832), the Sorrows of Werther. The literary excitement was raised to the highest pitch by the Räuber (Robbers) of Schiller (1759–1805), afterwards the friend and coadjutor of Goethe. By the joint exertions of these two great men German literature was brought to that classical perfection which, from a purely local, has since given it a universal influence. Of a highly individual character are the works of Jean Paul Richter (1763–1825), a writer of profound humour and pathos; and Jung Stilling (1740–1817), whose autobiography holds a peculiar place in German literature for the charming naïveté of its thought and style. In the departments of science and philosophy, we have the names of Moses Mendelssohn (1729–1786); A. G. Baumgarten (1714–62), the founder of the science of Æsthetics; the historians Mosheim (1694–1755), Dohm, Moser, Spittler, Johannes Müller; Adelung the philologist; Basedow and Pestalozzi the educationalists; Ernesti, Spalding, Rosenmüller, and Michaelis, theologians; Eichhorn in theology and universal and literary history; and the scientific writers Blumenbach, Euler, Vega, Herschel, and others. In the field of pure metaphysics Immanuel Kant was succeeded by Fichte (1762–1814), Hegel (1717–1831), and Schelling (1775–1854).

Partly produced by the influences of the *Sturm-und-Drang* period, and partly trained in the laws of art laid down and worked out by Goethe and Schiller, the so-called *romantic school*, distinguished by its enthusiasm for mediæval subjects and its love of what is mysterious and transcendental in life or thought, gradually succeeded in gaining public attention about this epoch. Amongst the principal writers of this school are Von Hardenberg, better known as Novalis (1772–1801), a pensée-writer of deep poetic insight; Ludwig Tieck (1773–1853), a writer of tales, dramas, and dramatic criticisms; La Motte Fouqué, Clemens Brentano, Hoffman, Musæus, Werner, Von Kleist, &c. The two Schlegels (August Wilhelm, 1767–1845, whose translation of Shakspere is still celebrated, and Friedrich, 1772–1829,

best known by his philosophy of history) also belong to this school.

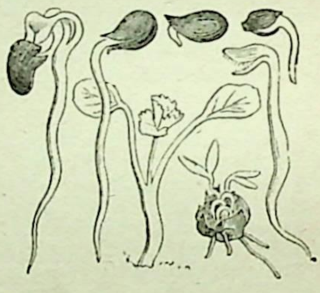
The war of liberation against Napoleon I. introduced a strong manly enthusiasm for a time into the hitherto gloomy and melancholy productions of the romanticists. Amongst the patriotic poets of the time Ernst Moritz Arndt (1769–1860) and Theodor Körner (1791–1813) hold the first place. The ballads and metrical romances of Ludwig Uhland (1787–1872) have brought him a world-wide fame. Friedrich Rückert (1789–1866) also may be noticed as a lyric poet of merit. During the excitement produced by the July Revolution in France (1830) a school of writers arose in whose works the social and political ideas of the time were strongly reflected. The most prominent names amongst this party are Ludwig Börne (1786–1837) and Heinrich Heine (1799–1856), whose writings combine the keenest satire and the finest pathos. Amongst the better known members of the school is Karl Gutzkow (1811–1878), a popular dramatist and novelist. As in England and France of late, the novel, especially the novel of a social or political character, has taken a prominent place in literature. Most distinguished are Freytag, Spielhagen, Heyse, Auerbach, Fanny Lewald, Hackländer, Reuter, Jensen, Storm, Rosegger, &c. Of late, however, science and learning rather than literature and the arts have produced the names of most eminence. Alexander von Humboldt (1769–1859) gave a great impulse to almost all branches of knowledge by his Cosmos, his Travels, and his Views of Nature, and by the general suggestiveness of his labours. In history, Niebuhr and Theod. Mommsen, the historians of Rome; Leopold Ranke, the historian of the Popes; Dahlmann, Gervinus, Sybel (French Revolution), Giesebrecht, Julian Schmidt, H. Kurz, and others may be mentioned. Biography has been well represented by Varnhagen von Ense, Pertz, David F. Strauss, and others. German modern theology and Biblical criticism has had lately much influence in the religious world. Baur, Bleek, and Ewald are among the widely-known names. Histories of art have been written by Kugler, Burckhardt, Lübke, and others. The brothers Grimm—Jakob (1785–1863), Wilhelm (1786–1859), were the founders of a new branch of philological and poetic investigation in ancient German literature. Eminent names in general philological science are those of Bopp, Pott, Schleicher, Steinthal, and Karl Brugmann. In natural sciences, Oken, Burmeister, Carus, Cotta, Liebig, Helmholtz, Virchow, Schleiden, Grisebach, Vogt, Bessel, Brehm, Häckel, Bastian, &c., are the eminent names; in philosophy, Schopenhauer, Feuerbach, Rosenkranz, Kuno Fischer, von Hartmann, Lotze, &c. Amongst recent poets Anastasius Grün (pen-name of Count von Auersperg) and Nikolas Lenau amongst Austrian, and Meissner and Hartmann, natives of Bohemia, have a considerable reputation. Hervegh, Hoffmann von Fallersleben, Freiligrath, and Franz Dingelstedt infuse strong political sentiments into their poetry. Emmanuel Geibel, Von Scheffel, Bodenstedt, and others represent a poetry more comprehensive in its aims and tendencies.

Germersheim (ger′-mėrz-hīm), a town and fortress in the Bavarian Palatinate on the Rhine, 8 miles s.w. of Speier. Pop. 6132.

Germinal (Fr. zhăr-mē-năl), the seventh month of the first French republican calendar, March 21—April 19.

Germinal Vesicle, (*a*) in animal physiol. the nucleus of the ovum or egg of animals. It contains within it a nucleolus called also the *germinal spot*. The germinal vesicle undergoes important changes in the early stages of the development of the egg into the embryo. (*b*) In bot. a cell contained in the embryo sac, from which the embryo is developed.

Germination, the first act of growth by an embryo plant. The immediate causes of



Seeds germinating. (In centre a plant which has newly appeared above ground.)

germination are the presence of moisture and atmospheric air and a certain elevation of temperature. Moisture softens the integuments of the seed and relaxes the tissue of the embryo; atmospheric air supplies oxygen and nitrogen; and a temperature which must be at least as high as 32° Fahr., by

exciting the vitality of the embryo, enables it to take advantage of the agents with which it is in contact. During germination various changes take place in the chemical constituents of the seed, and are usually accompanied with increase of temperature, as is seen in the process of malting. Along with these other changes commonly take place: a root is produced, which strikes perpendicularly downwards and, fixing itself in the soil, begins to absorb food; a growth upwards then commences and ends in the protrusion of a stem and leaves.

Germ Theory of Disease, the theory that certain diseases are communicated from an infected person to an uninfected one by living organisms which gain access to the body of the afflicted person by the air or food, or drink, and which, growing and multiplying in the body they invade, produce the changes characteristic of the particular disease. The period during which the living particles of contagious matter retain their vitality, like the rate of their growth and multiplication, varies in different cases, but it is limited in all. Few, if any, resist the destructive influence of a temperature of 300° Fahr., while most succumb at the temperature of 200° or even less, particularly if exposed for some time. Animal poisons generally are destroyed by boiling, and clothes, sheets, &c., infected, may be rendered pure by being exposed to a temperature of 300° Fahr. These living organisms are grouped together as microbes or micro-organisms, and are divided into different classes. The *micrococcus* is a round form about the 32,000th of an inch in size, and multiplies by fission. The *bacterium* is rod-shaped, about the 10,000th of an inch long, with rounded ends; it also multiplies by fission. The *bacillus* is a third form also rod-shaped, and somewhat larger than the bacterium. They often form long chains or threads, and increase by division and by spore formation. *Vibrio* and *spirillum* are somewhat similar forms; and, like the others, increase with a rapidity beyond conception. The connection between these micro-organisms and the various forms of zymotic disease has been thoroughly established. The only method of investigation that yields reliable results, is to separate the organism supposed to be the cause of the disease, and cultivate it outside of the body. Thus a drop of blood from a person suffering from a special disease, which contains the bacteria, or bacilli, &c., believed to be the producers of the disease, is placed in a flask containing a nourishing material, care having been taken to destroy all other organisms in the flask. The special microbe flourishes there, let us suppose. It is then cultivated in one flask after another through successive generations, only a single minute drop of the material in one flask being used to inoculate a succeeding one. In this way a pure cultivation is obtained, a cultivation, that is, containing the particular microbe and none other. If this is the true cause of the disease, then a drop of the solution containing it introduced into the body of an animal, capable of the disease, ought to produce it, and the particular organism introduced should be found multiplying in the blood and tissues of the infected animal. Such a demonstration has been given of the cause of a few diseases. Dr. Koch, of Berlin, published in 1876 a paper giving a full account of the life history of the bacillus organism which had been observed in animals dead of splenic fever; and in 1877 the great French chemist, Pasteur, proceeded to investigate the subject, and his investigations conclusively support the germ theory of disease. In 1882 Dr. Koch, of Berlin, announced the discovery of a micro-organism in tuberculosis, a disease believed to be the chief, if not the only, cause of consumption of the lungs. These microbes are found not only in the lungs of persons who have died of tubercle, but also in the spit of tubercular and consumptive patients, and multiply also by spores. Thus it is that the spit of a consumptive patient, even after it has dried up, may be capable of imparting the disease, owing to spores being scattered in the air. After the epidemic of cholera in Egypt in 1883, which spread to France and Italy, investigations were undertaken by French, German, and British commissioners. Dr. Koch detected a peculiar bacillus, shaped like a comma (,), in the intestines of persons who had died of cholera, in the discharges from cholera patients, &c. He believed that this bacillus was the active agent in the production of the disease; but other authorities were unable to accept Dr. Koch's view that the comma-bacillus was the cause of the disorder. All investigation, however, seems to point to the fact that every infectious or contagious disease is due to some form of micro-organism, and that there is one particular organism for each particular disease. Each organism produces its own disease and none other; and the

special disease cannot arise unless its germ has gained entrance to the body. The channels through which these germs obtain entrance are innumerable, but they have one origin and one only, and that is a preceding case of disease. The 'germ theory' affords the hope and suggestion of a method of diminishing, if not of getting rid of, such diseases altogether, and to some extent also indicates the direction in which their cure is to be sought. If the particular microbe of each contagious disease were known, the condition of its life and activity understood, there is great probability that its multiplication in the living body could be arrested, and the disease thus cured. Even without such knowledge, however, the germ theory indicates that the means for arresting the spread of contagious diseases and diminishing their occurrence consist in preventing the spread of the germs from an existing case of disease. See *Disinfectant.*

Gérôme (zhā-rōm), JEAN LÉON, a French painter, born in 1824 at Vesoul. He came



Jean Léon Gérôme.

to Paris and studied under Paul Delaroche. In 1853 he travelled in the East. In 1855 the first of his great pictures, The Age of Augustus and the Birth of Christ, appeared, and four years later his picture of the Roman gladiators, Ave Cæsar Morituri te salutant. In 1861 he exhibited his celebrated Phryne before her Judges. In 1863 he was appointed a professor at the École des Beaux-Arts. Many of his pictures have been exhibited in London, and his works are in great favour in England and the U. States as well as in his native country. Besides those already mentioned the following are amongst the chief works of Gérôme: Louis XIV. and Molière, Death of Cæsar, The Plague at Marseilles, Rex Tibicen, L'Éminence Grise, and various scenes from Oriental life. M. Gérôme has been decorated with the Prussian order of the Red Eagle and made a commander of the legion of honour.

Gerona (*h*ā-rō'nȧ), a fortified town of N. E. Spain, capital of the province of Gerona, in Catalonia, at the confluence of the Oña and the Ter, 52 miles north-east of Barcelona. It consists of an old and a new town, the former on the slope of a hill, with antiquated houses and a stately cathedral. There is spinning and weaving; also paper factories. Gerona was once the residence of the kings of Arragon, and as a place of strategic importance has sustained many memorable sieges. Pop. 14,009.—The PROVINCE, area 2270 square miles, abuts on the Mediterranean, is mountainous and mostly rugged, but with many fertile valleys, which produce olives, wine, wheat, rye, &c., and all kinds of fruits and vegetables. Pop. 309,008.

Geropigia, JERUPIGIA (je-ro-pi'ji-a, je-ru-pi'ji-a), a mixture composed of unfermented grape-juice, with sufficient brandy and sugar to prevent it from fermentation, and colouring matter from rhatany root or log-wood, imported from Portugal, to give spurious strength and colour to port wines.

Gers (zhār), a department in the S.W. of France, separated from the Bay of Biscay by the department of Landes; area, 2425 square miles. The southern part is covered with ramifications of the Pyrenees separated by valleys, each of which is watered by its own stream. The chief of these are the Gers, Losse, Save, &c. More than half the land is under the plough, and about a seventh in vineyards. Much of the wine is made into Armagnac brandy. Auch is the capital. Pop. 274,391.

Gerson (zhār-sōn), JEAN DE, properly JEAN CHARLIER, a celebrated French theologian, born at Gerson in 1363. He studied at the University of Paris, received the doctorate in 1392, and in 1395 became Chancellor of the University. He was ardent and courageous in advocating improvements and reforms, but mostly only succeeded in making for himself powerful enemies. He is mainly remembered in connection with his efforts to bring about a cessation of the great schism which had divided the church since 1378. His proposal was to depose both the rival popes and elect a third in their room—a step which was actually taken by the council held at Pisa

in 1409, of which Gerson was a member as deputy of the University of Paris. This proceeding, however, was a failure, the only result being that there were three rival popes instead of two. When the Council of Constance (1414–18), in which also Gerson took a leading part, likewise proved unable to settle the differences existing in the church, he at last gave up the struggle in despair, and not daring to return to France, where his enemies had then the upper hand, sought shelter for a time in Bavaria and Austria. In 1419 he returned to his native country, and spent the last ten years of his life with his brother, the prior of a community of Celestine monks at Lyons, living an ascetic life, and devoting himself to religious meditation and the composition of theological and other treatises. The authorship of the Imitation of Christ, by Thomas-a-Kempis, was at one time erroneously ascribed to him.

Gerstäcker (ger'-stek'ėr), FRIEDRICH, a German traveller and novelist, born at Hamburg 1816, died in 1872. In 1837 he went to America, where he earned a living by the most various employments—as a sailor, stoker, innkeeper, woodcutter, and trapper and hunter in the prairies of the west. He returned to Germany in 1843, and began his literary life by the publication of his experiences in America, Streif-und Jagdzüge durch die Vereinigten Staaten Nordamerikas (Dresden, 1844). This was followed by Die Regulatoren in Arkansas; Die Flusspiraten des Mississippi; Mississippibilder, &c. In 1849 Gerstäcker was engaged on behalf of the German government to collect information which might be useful to German emigrants. The results were published under the title of Reisen in 1853. He afterwards made voyages to South America, to Egypt, West Indies, and other places, which are described in his Neue Reisen (1868). Amongst his many romances (most of which may be had in English) are Die beiden Sträflinge (1856), Im Busch (1864), General Franco (1865), Californische Skizzen (1856), and others.

Gerund, the name given originally to a part of the Latin verb which possesses the same power of government as a verb, but also resembles a noun in being governed by prepositions. In early English or Anglo-Saxon a dative form of the infinitive is used to indicate purpose, and is often called the gerund. In modern English what seems to be a present participle governed by a preposition is sometimes denominated a gerund, in such phrases, for example, as 'fit for teaching;' but this is merely a verbal noun representing the old Anglo-Saxon noun in *-ung*.

Gervaise, or GERVASE, a monk of Canterbury, born in 1150. Amongst his writings is an important chronicle, Chronica de tempore regum Angliæ, Stephani, Henrici II. et Ricardi I. It is reprinted in Twysden's collection. Gervaise died probably about 1200.

Gervaise (or GERVASE) **of Tilbury**, a chronicler of the twelfth and thirteenth centuries, born at Tilbury in Essex about the middle of the twelfth century. Having completed his studies in England, he visited the courts of Italy and of Germany, was appointed by Otto IV. Marshal of the Kingdom of Arles. He died, according to some, in 1218. His chief works are Otia Imperialia (containing a history of the kings of France and England); Illustrationes Galfridi Monemuthensis (Illustrations of Geoffrey of Monmouth); Historia Terræ Sanctæ (History of the Holy Land); De Origine Burgundiorum (On the Origin of the Burgundians). Most of his writings still remain in manuscript in the Cottonian collection and the Corpus Christi library, Cambridge.

Gervas, a small shrub, the *Stachytarpheta jamaicensis*, nat. order Verbenaceæ, a native of the West Indies and warm parts of America, the leaves of which are sold in Austria under the name of Brazilian tea, and used in Britain to adulterate tea.

Gervi'nus, GEORG GOTTFRIED, a German critic and historian, born at Darmstadt May 20, 1805. He quitted commerce in 1825 to study at Heidelberg, was for some time a teacher, and qualified as a privat-docent. After a visit to Italy he published his Geschichte der Poetischen Nationalliteratur der Deutschen (History of the Poetic National Literature of the Germans, 1835–42). In 1835 he was appointed extraordinary professor at Heidelberg, and the following year ordinary professor of history and literature at Göttingen; but in 1837, being one of the seven professors who protested against King Ernst August's breach of the constitution, he was banished from Hanover. After another visit to Italy he returned to Heidelberg, where in 1844 he was appointed an honorary professor. He now began to take an active part in politics on the liberal side; became editor of the newly-founded Deutsche Zeitung, and was returned to the

federal diet by the Hanse towns. Discontented with the tendency of affairs after 1848, he gave up politics and resumed his old studies. In 1849 he published the first part of his great work on Shakspere, in 1853 his History of German Poetry, and in 1855 the first volume of his History of the Nineteenth Century, which, however, was never carried farther than the French revolution of 1830. Amongst his last writings was a critical essay on Handel and Shakspere. He died in 1871.

Gese'nius, Friedrich Heinrich Wilhelm, a German orientalist and Biblical critic, born in 1786, studied at Göttingen, and became professor of theology at Halle. In 1810–12 his Hebrew and Chaldee Dictionary of the Old Testament appeared. In 1820 he visited Paris and Oxford for the purpose of collecting materials regarding the Semitic languages. In 1829 he published his large Thesaurus philologico-criticus Linguæ Hebraicæ et Chaldaicæ, completed in 1858 by Rödiger. Besides the works mentioned, Gesenius wrote a Hebrew Grammar, a history of the Hebrew language, and notes to the German translation of Burckhardt's Travels in Syria and Palestine. He died in 1842.

Gesner (ges'nėr), Konrad von, German scholar, born at Zürich in 1516, studied at Strasburg, Bourges, and Paris, and became schoolmaster in his native town. Hoping to raise himself from his needy condition he went to Basel, and devoted himself particularly to the study of medicine. Afterwards he became successively professor of Greek at Lausanne, and of philosophy at Zürich. He did important work in the departments of history, zoology, and botany. His Bibliotheca Universalis is a descriptive catalogue of all writers extant in Greek, Latin, and Hebrew. His Historia Animalium must be regarded as the foundation of zoology; and in botany he was the inventor of the method of classifying the vegetable kingdom according to the characters of the seeds and flowers. He died of the plague at Zürich, 1565.

Gesnera'ceæ, an order of monopetalous exogens, typical genus *Gesnera*. There are many species, mostly natives of tropical and sub-tropical regions. They are shrubby herbs, often with tuberous rhizomes, and scarlet, violet, or blue flowers. Some of the genera are frequent in our hothouses, such as Gloxinia, Achimenes, Gesnera, &c.

Gessler. See *Tell.*

Gessner (ges'nėr), Salomon, a German poet and artist, was born at Zürich in 1730, died there 1788. In 1749 he was sent by his father to learn the business of bookselling at Berlin, but having taken a dislike to the business he maintained himself by executing landscapes. On his return to Zürich he published Daphnis, a small volume of idylls, and Tod Abels (The Death of Abel), a kind of pastoral idyll in prose. These idylls acquired for him a great reputation amongst contemporaries. For some years afterwards he devoted himself to the engraving art, in which he also became very eminent. He died in 1787.

Gesta Romano'rum ('Deeds of the Romans'), the usual title of a collection of short tales, legends, &c., in Latin, very popular during the middle ages. The book was probably written about the close of the 13th century by a certain monk Elinandus, an Englishman or a German. The separate tales making up the Gesta are of very various contents, and belong to different times and countries, the sources from which they are derived being partly classical, partly oriental, and partly western. Whatever may have been the intention of the original compiler, they very soon were adapted to the moralizing tendencies of the time, and moral reflections and allegorical interpretations were added to them, it is said, by a Petrus Bercorius or Pierre Bercaire of Poitou, a Benedictine prior. After the Reformation the book fell into oblivion.

Gestation (Latin, *gestare*, to bear), in physiology, the name given to the interval which elapses between the impregnation of any of the mammalia and the period of birth. This period varies from 25 days, in the case of the mouse, to 620, in that of the elephant.

Geste, Chansons de. See *France—Literature.*

Getæ, an ancient people of Europe, dwelling at first in Thrace; afterwards a part of them moved west on the north bank of the Danube, where they were known to the Romans as the Daci. (See *Dacia.*) Another portion moved east into Asia.

Gethsemane (geth-sem'a-nē; 'oil-press'), an olive garden or orchard in the neighbourhood of Jerusalem, memorable as the scene of the last sufferings of our Lord. The traditionary site of this garden places it on the east side of the city, a very little beyond the Kedron, near the base of Mt. Olivet. It contains some very old olive-trees, piously regarded as having stood there in the time of our Lord.

Gettysburg, the capital of Adams County, Pennsylvania. Here are the Pennsylvanian College (Lutheran), founded in 1832; the national cemetery for Union soldiers, and a national homestead for the orphans of Union soldiers. At Gettysburg a battle was fought (July 1, 2, and 3, 1863) between the Union forces under General Meade and the Confederate forces under General Lee, in which the latter suffered a disastrous defeat.

Geum (jē'um), a genus of hardy herbaceous perennials, belonging to the nat. order Rosaceæ, chiefly natives of the northern parts of the world. Two of them are common British plants known by the name of avens. *G. canadense*, chocolate-root, or blood-root, a North American species, has some reputation as a tonic. A species of saxifrage is also called *Geum*.

Geysers, a slight alteration of the Icelandic name *geysir*, from *geysa*, to gush or rush forth, and applied to natural springs of hot water of the kind that were first observed in Iceland. The geysers of Iceland, about a hundred in number, lie about 30 miles N.W. of Mount Hecla, in a plain covered by hot-springs and steaming apertures. The two most remarkable are the Great Geyser and the New Geyser or Strokkur (churn), the former of which throws up at times a column of hot water to the height of from 80 to 200 feet. The basin of the Great Geyser is about 70 feet across at its greatest diameter. The New Geyser, which is only 100 yards distant, is much inferior in size. The springs are supposed to be connected with Mount Hecla, and the phenomenon of eruption has been explained by Tyndall as due to the heating of the walls of a fissure, whereby the water is slowly raised to the boiling point under pressure, and explodes into steam, an interval being required for the process to be repeated. The geysers of Iceland, however, have been surpassed by those discovered in the Rocky Mountains in the Yellowstone Region of Wyoming Territory, the largest of which throw up jets of water from 90 to 250 feet high. (See *Yellowstone*.) The hot-lake district of Auckland, New Zealand, is also famous in possessing some of the most remarkable geyser scenery in the world. These phenomena are of three kinds: the puias (fire-springs), geysers continually or intermittently active; ngawhas or inactive puias, which emit steam, but do not throw up columns of water; and waiariki or hot-water cisterns. This region is remarkable for the number of natural terraces containing hot-water pools or cisterns, and its lakes all filled at intervals by the boiling geysers and thermal springs, but the configuration of the country was considerably altered by the disastrous volcanic outbreak of 1886. Ngahapu or Ohopia, a circular rocky basin, 40 feet in diameter, in which a violent geyser is constantly boiling up to the height of 10 or 12 feet, emitting dense clouds of steam, is one of the natural wonders of the southern hemisphere.

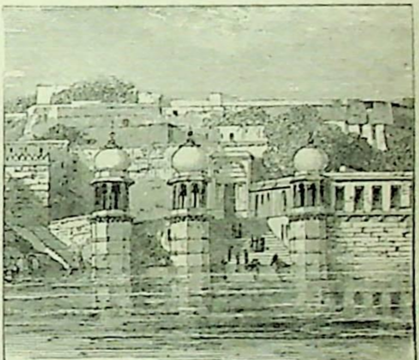
Ghadames (ghä-dä'mes), a town of North Africa, in the south-west of Tripoli. It is about 310 miles S.W. of the town of Tripoli, is situated in the midst of an oasis, and is the centre of caravan routes to Tunis, Tripoli, &c. Figs, dates, barley, wheat, &c., are grown in the gardens, which are watered by a hot-spring. Pop. about 7000.

Ghagra, or GHOGRA. See *Gogra*.

Ghara, or GARRA, a river in the Punjab, being the name by which the united streams of the Bias and Sutlej are known, from their confluence at Endrisa to the junction with the Chenab, after which the united waters flow under the name of the Punjnad to the Indus. Length about 300 miles.

Ghardaya. See *Gardaya*.

Ghâts (gäts), or GHAUTS, a Hindu term employed to designate landing-stairs on a river, especially when large and substantially constructed. These ghâts are very numerous on the Ganges, and are great places of resort by the people of the towns where they are situated. Some of them are noteworthy from an architectural point of view, having temples, bathing-houses, &c., at the top.



Bathing Ghâts on the River Jumna at Muttra.

Ghâts, or GHAUTS, EASTERN and WESTERN, two ranges of mountains in the peninsular portion of Hindustan, the former running down the east side of India, but leaving broad tracts between their base and the coast; the latter running down the west side, but leaving only a narrow strip between them and the shore. Both meet near Cape Comorin. The general elevation of the Western Ghâts varies from 4000 to 7000 feet. Its best known portion is the Neilgherries, with Dodabetta Peak, their highest point 8760 feet above the sea. The Western Ghâts form a watershed, and the rain collected on its eastern slopes makes its way right across India to the Bay of Bengal. They are covered with fine forests, and have most picturesque scenery. The Eastern Ghâts are of considerably less elevation, on the average about 1500 feet, and have none of the beauty of the western range. They are, however, rich in metals.

Ghazipur, a town in Hindustan, headquarters of the Ghazipur District, North-western Provinces, about 44 miles north-east of the town of Benares. It stretches along the banks of the Ganges; has a trade in sugar, tobacco, rose-water, and otto of roses; and is a healthy place. The ruins of the Palace of the Forty Pillars, and a monument to Lord Cornwallis, who died here in 1805, are here. Pop. 44,970. The district, one of the hottest and dampest in the N.W., has an area of 1473 sq. miles, and a population of 1,077,909 persons.

Ghazna, GHUZNEE, or GHIZNI, an ancient and celebrated city and fortress in Afghanistan, 84 miles S.S.W. Cabul, on an eminence 7726 feet above sea-level. The wall embraces the whole of the hill; the houses are of mud; the streets, dark, narrow, and irregular. The country round Ghazna is very productive in grain, fruits, tobacco, &c. Three miles north-east are the ruins of the ancient city, which, under the celebrated Sultan Mahmud (999–1030) (see *Ghaznavides*), was the capital of a great empire. It has been twice taken by British forces (1839 and 1842).

Ghaznavides (-vīdz), a dynasty founded in 961 by Alepteghin, originally a slave belonging to the Ameer of Bokhara. Ghazna was the seat of his power, and became, under his successors, the capital of an empire which reached from the Tigris to the Ganges, and from the Sihon to the Indian Ocean. The most brilliant period of the dynasty was that of Sultan Mahmud (999–1030). It became extinct towards the end of the 12th century after having lost most of its possessions.

Ghebers (gē'bėrz). See *Guebers*.

Ghee (gē), or GHI, a peculiar kind of butter in use among the Hindus. It is made from the milk of the buffalo or the cow. The milk is boiled for an hour or so, and cooled, after which a little curdled milk is added. Next morning the curdled mass is churned for half an hour; some hot water is then added, and the churning continued for another half-hour, when the butter forms. When, after a few days, it becomes rancid, it is boiled till all the water is expelled, and a little more curdled milk added with some salt or betel-leaves, after which it is put into pots. In this state it will keep for a long time. It is too strong for European taste, but is a favourite article of consumption amongst rich Hindus.

Gheel (gāl), a village and commune in Belgium, 26 miles E.S.E. of the town of Antwerp and in the province of that name. It is situated in a fertile spot in the midst of a sandy waste, and is inhabited by a class of peasant farmers. It has manufactures of cloth, hats, wax and tallow candles, &c.; tanneries, dye-works, ropeworks, &c., and a considerable trade in butter. The commune has been long remarkable for containing a colony of deranged persons, numbering at present about 1600, who are lodged and boarded in the houses of the country people, who make use of their services, when available, in field and other labour. Little or no restraint is employed, and the best effects thence ensue. Lately a hospital has been erected, with a medical staff, for the supervision of the relations between the insane and their custodiers. Patients are sent hither from all parts of Belgium. Pop. 10,916.

Ghent (gent; French, *Gand;* Flemish, *Gend* or *Gent*), a town in Belgium, capital of the province of East Flanders, in a fertile plain at the confluence of the Lys with the Scheldt. It is upwards of 6 miles in circumference, and is divided by canals into a number of islands connected with each other by bridges. Except in some of the older parts it is well built, and has a number of fine promenades and many notable buildings. Amongst the latter are the cathedral of St. Bavon, a vast and richly-decorated structure, dating from the 13th century; the church of St. Nicholas, the oldest in Ghent; the church of St. Michael, with a celebrated Crucifixion by Vandyk; the university, a handsome modern

structure, with a library of about 200,000 volumes and 2500 MSS.; the Hôtel-de-Ville; the Belfry, a lofty square tower surmounted by a gilded dragon, and containing a fine set of chimes consisting of forty-four bells, one of which is the famous 'Roland of Ghent'; the new Palais-de-Justice; the Marché du Vendredi, an extensive square, interesting as the scene of many important historical events; and Les Béguinages, extensive nunneries founded in the 13th century, the principal occupation of whose members is lace-making. Ghent has long been celebrated as a manufacturing town, especially for its cotton and linen goods and lace. Other industries of importance are sugar-refining, hosiery, thread, ribbons, instruments in steel, carriages, paper, hats, delft-ware, tobacco, &c. There are also machine-works, engine-factories, roperies, tanneries, breweries, and distilleries. Ghent is famous for its nurseries and flower traffic. The general trade is large. A canal, 16 feet deep and 11 yards wide, connects the town with the Scheldt at Terneuzen, but is less used than it might be on account of the heavy imposts levied by Holland on vessels passing through. Another canal connects the Lys with the canal from Bruges to Ostend. Pop. 160,848.—Ghent is mentioned as a town in the 7th century. In the 9th century Baldwin, the first count of Flanders, built a fortress here against the Normans. Under the counts of Flanders Ghent continued to increase, and in the 14th century could send 50,000 men into the field. The wealth and liberty of its citizens disposed them to a bold maintenance of their privileges against the encroachments of feudal lords like the Dukes of Burgundy and the kings of Spain. Two great revolts took place under the leadership of the Van Arteveldes (1338 and 1369) against Burgundy, and again in the 16th century against Charles V. But by this time the great municipalities of the middle ages were decaying in power and vigour, and the citizens of Ghent, besides losing their privileges, had to pay for the erection of a citadel intended to keep them in bondage. In 1792 the Netherlands fell under the power of France, and Ghent became the capital of the department of Escaut (Scheldt). In 1814 it became, along with Flanders, part of the Netherlands, till the separation of Belgium and Holland. See *Belgium*.

Gherardesca (gä-rär-des'kä), a family of Tuscan origin which plays an important part in the history of the Italian republics of the middle ages. Historically the most prominent member of the family is Ugolino, whose death, and that of his two sons and grandsons, by starvation in the 'Tower of Hunger,' is described in one of the celebrated passages of Dante's Divina Commedia. Ugolino had made himself master of Pisa, and had behaved in the most cruel and arbitrary manner for four years, when, in 1288, he was overthrown by a conspiracy.

Ghetto (get'to), a name used in different towns of Italy, Germany, and other countries to indicate the quarter set apart for the residence of Jews.

Ghibellines (gib'el-lïnz), the name of a political party in Italy, which, in general, favoured the claims of the emperor against those of the pope. The name is said to be derived from Waiblingen, a small estate belonging to the Hohenstaufen princes. See *Guelfs and Ghibellines*.

Ghiberti (gē-ber'tē), Lorenzo, Italian statuary, born about 1378 at Florence. He early learned from his stepfather Bartoluccio, an expert goldsmith, the arts of drawing and modelling, and that of casting metals. He was engaged in painting frescoes at Rimini, in the palace of Pandolfo Malatesta, when the priori of the society of merchants at Florence invited artists to propose models for one of the bronze doors of the baptistery of San Giovanni. The judges selected the works of Donatello and Ghiberti as the best (according to Vasari, also that of Brunelleschi, who is not mentioned by Ghiberti himself as one of the competitors); but the former voluntarily withdrew his claims, giving the preference to Ghiberti. After twenty-one years' labour Ghiberti completed the door, and, at the request of the priori, executed a second, after almost as long a period. Michael Angelo said of these, that they were worthy of adorning the entrance to paradise. During these forty years Ghiberti also completed other works, bas-reliefs, statues, and some excellent paintings on glass, most of which may be seen in the cathedral and the church of Or San Michele at Florence. He died about 1455.

Ghika, Helena, Princess Koltzoff-Massalsky, better known by the pseudonym of Dora d'Istria, a writer of travels, historical studies, and novels. She was the daughter of Prince Michael Ghika, and niece of Gregory Ghika X., hospodar of Wallachia, and was born at Bukarest in 1828. She was carefully educated, and acquired by frequent

travels an extensive knowledge of modern languages and literature. In 1849 she was married to Prince Koltzoff-Massalský. Her first important work, La Vie Monastique dans l'Eglise Orientale, was published at Paris in 1855. La Suisse Allemande, Les Femmes en Orient, Des Femmes par une Femme, represent social and political studies on modern civilization. In Au bord des Lacs Helvétiques (1864) she collected a number of stories written for the Revue des Deux Mondes. Amongst her other works are Eli Albanesi in Rumenia; La Poésie des Ottomans (1877). She died in 1888.

Ghilan (gi-län'), a province of Persia, on the south-west shore of the Caspian Sea; area, about 4250 square miles. The lofty range of the Elburz Mountains forms its southern boundary. The whole province, except where cleared for cultivation and on the mountain summits, is covered with woods, and the excessive rain and dense vegetation render much of the level country a morass. The climate is consequently unhealthy. The province is rich in metals and very fertile. The capital is Resht. Pop. about 150,000.

Ghirlandaio (gir-län-dä'yō), or CORRADI DOMENICO, one of the older Florentine painters, born at Florence in 1450, died 1495. He was the son of a goldsmith known as Il Ghirlandaio (the garland-maker), from his skill in making garlands. He was distinguished by fertility of invention, a more natural rendering of life, and a more accurate perspective than his predecessors. Amongst his best works are the frescoes in the Sassetti Chapel of the Trinity Church and in the choir of Santa Maria Novella at Florence, and the pictures in the Uffizi and the academy at Florence.

Ghizeh. See *Gizeh.*

Ghiznevides. See *Ghaznavides.*

Ghizni. See *Ghazna.*

Ghoorkas. See *Goorkas.*

Ghost, HOLY. See *Holy Ghost.*

Ghost-moth, a nocturnal lepidopterous insect (*Hepiălus humŭli*), so called from the male being of a white colour, and from its habit of hovering with a pendulum-like motion in the twilight over one spot (often in churchyards), where the female, which has gray posterior wings and red-spotted anterior wings, is concealed.

Ghur, or GHOR, a mountainous district of Afghanistan, lying to the south of Herat, and of some importance in the history of the country. This district was the original seat of the second Mohammedan dynasty in Hindustan, the princes of Ghur, who, in the 11th and 12th centuries, included in their kingdom of Ghur, Afghanistan, Lahore, Sind, and Khorasan.

Ghuznee. See *Ghazna.*

Giallo antico (jäl'ō än-tē'kō), the Italian name of a kind of fine yellow marble, used in ancient Roman architecture and obtained from Numidia.

Gianibelli, or GIAMBELLI (jän-i-bel'lē, jäm-bel'lē), FEDERIGO, an Italian military engineer, born at Mantua about 1530. After having offered his services to Philip II. of Spain without much result, he went to England, where Elizabeth gave him a pension and sent him to help the Netherlanders in their defence of Antwerp against the Spaniards (1585). Here he made himself famous by the damage which his inventions did to the enemy. After this he returned to England, where he fortified the coast-line against the Spanish invasion, and suggested the use of fire-ships, which was so disastrous to the Armada.

Giannone (jän-ō'nā), PIETRO, Italian author equally celebrated by his fate and by his writings, born in 1676. He studied law in Naples, and after winning a high place as an advocate retired to give himself up to the execution of his great work, the Civil History of the Kingdom of Naples (1723). The severity with which Giannone treated the church, and the attacks which he made on the temporal power of the popes, drew upon him the persecutions of the court of Rome, and of the clergy in general. The offensive publication was burned, and the author excommunicated. Giannone therefore quitted Naples, 1723, and took refuge in Vienna, where, for a time, he was protected by the influence of powerful friends, but had ultimately to leave and betake himself to Venice in 1734. Expelled from Venice by the suspicious republic, he finally took refuge in Geneva. Here he wrote his Triregno, a bitter attack on the papal pretensions. In 1736, having been enticed by a government emissary to enter the Sardinian States, he was seized and imprisoned in the citadel of Turin, where he died in 1748.

Giant Powder, a name in America for dynamite.

Giants, people of extraordinary stature. History, both sacred and profane, makes mention of giants, and even of races of giants, but this in general occurs only at an early stage of civilization when the national

mind is apt to exaggerate anything unusual. Hence the Cyclopes and Læstrygones of the ancients and the Cornish and Welsh giants of English folk-lore. The first mention of giants in the Bible is in Gen. vi. 4, where the Hebrew word used is *nephilim*, a word which occurs in only one other passage, where it is applied to the sons of Anak, who dwelt about Hebron, and who were described by the terrified spies as of such size that compared with them they appeared in their own sight as grasshoppers. A race of giants called the Rephaim is frequently mentioned in the Bible, and in Gen. xiv. and xv. appear as a distinct tribe, of whom Og, king of Bashan, is said to have been the last. Other races of giants are mentioned, such as the Emim, the Zuzim, and the Zamzummim. The giants of old Greek or of Norse mythology have, of course, merely a symbolic existence, representing benignant or adverse forces of nature on which man might count in his struggle to reduce the world around him into some kind of order. The tales of old writers regarding gigantic human skeletons have now no importance, it being mostly certain that these bones do not belong to giants, but to animals of the primitive world which, from ignorance of anatomy, were taken for human bones. The ordinary height of men is between 5 and 6 feet; amongst the Patagonians of South America, however, the average seems to be considerably higher, though not so high as to entitle them to be considered a race of giants. Notable deviations from this medium height are not at all uncommon, especially among the Teutonic peoples. The following are amongst authentic instances, ancient and modern, of persons who attained to the stature of giants: The Roman Emperor Maximin, a Thracian, nearly 9 feet high; Queen Elizabeth's Flemish porter, 7 feet 6 inches; C. Munster, a yeoman of the guard in Hanover, who died in 1676, 8 feet 6 inches high; Cajanus, a Swedish giant, about 9 feet high, exhibited in London in 1742; C. Byrne, who died in 1783, attained the height of 8 feet 4 inches; Patrick Cotter O'Brien, who lived about the same time, was 8 feet 7¾ inches; a Swede in the celebrated grenadier guard of Frederick William I. of Prussia stood 8½ feet. In 1884 died Pauline Wedde (called Marian), over 8 feet 2 inches at the age of eighteen. The following are still or were quite recently exhibiting; Anna Swan, a native of Nova Scotia, above 8 feet high; her husband, Captain Bates, a native of Kentucky, of the same height; Chang-wu-gon, the Chinese giant, 7 feet 9 inches high. As a rule giants are comparatively feeble in body and mind, and are short-lived. Gigantic stature is generally accompanied by a want of proportion in parts, some parts growing too quickly for others, or continuing to grow after the others have ceased. The relation between the upper and lower half of the body is not disturbed; but the skull, brain, and forehead are relatively small, the jaws very large, the shoulders, breast, and haunches very broad, and the muscular system comparatively weak.

Giant's Causeway, an extensive and extraordinary assemblage of polygonal basaltic columns on the north coast of Ireland, in the county of Antrim, between Bengore Head and Port Rush. The name is sometimes given to the whole range of basalt cliffs along the coast, some of which reach the height of 400 or 500 feet; but it is more properly restricted to a small portion of it where a platform of closely-arranged basalt columns from 15 to 36 feet in height runs down into the sea in three divisions, known as the Little, the Middle, and the Grand Causeway. The last is from 20 to 30 feet wide, and stretches some 900 feet into the sea. The Giant's Causeway derives its name from the legend that it was built by giants as a road which was to stretch across the sea to Scotland. There are similar formations on the west coast of Scotland, on the island of Staffa.

Giaour (jour), a Turkish word from Persian *gawr*, an infidel, used by the Turks to designate the adherents of all religions except Mohammedan, more particularly Christians. The use of it is so common that it is often applied without intending an insult.

Giarre (ji-är′rā), a Sicilian town near the coast, in the province of Catania. In the neighbourhood are what is left of the famous chestnut trees of Ætna. Pop. 7891.

Gibbon, a name common to the apes of the genus *Hylobătes*, but more particularly restricted to the species *Hylobătes lar*, which inhabits the islands of the Indian Archipelago. It is distinguished from other quadrumanous animals by the slenderness of its form, but more particularly by the extraordinary length of its arms, which, when the animal is standing, reach nearly to the ankles, and which enables it to swing itself from tree to tree with wonderful agility. Its colour is black, but its face is com-

monly surrounded with a white or gray beard.

Gibbon, EDWARD, an eminent English historian, was born at Putney in Surrey, April 27, 1737. He was the son of a gentleman of an ancient Kentish family. He entered Magdalen College, Oxford, where he remained fourteen months. Having declared himself a Roman Catholic, his father placed him under the care of M. Pavillard, a learned Calvinistic minister at Lausanne, by whom he was reconverted to the Protestant faith. His residence at Lausanne was highly favourable to his progress in knowledge and the formation of regular habits of study. The belles-lettres and the history of the human mind chiefly occupied his attention. In 1758 he returned to England, and immediately began to lay the foundation of a copious library; and soon after composed in the French language his Essai sur l'Étude de la Littérature (1761). In 1763 he visited Paris and Lausanne, and he journeyed in Italy during 1764. It was here that the idea of writing his great history occurred to him as he sat musing among the ruins of the capitol at Rome, while the barefooted friars were singing vespers in the Temple of Jupiter. In 1770 he published a pamphlet entitled Critical Observations on the Sixth Book of the Æneid. In 1774 he obtained a seat in parliament for Liskeard, and was a silent supporter of the North administration and its American politics for eight years. In 1776 the first quarto volume of his Decline and Fall of the Roman Empire was published, and at once made a public reputation for its author. In 1778 he drew up on behalf of the English government a Mémoire Justificatif in answer to the manifesto of the French court, and for this service he was made one of the lords of trade. On the retirement of North he lost his appointment, and soon after withdrew to Lausanne (1783), where, in the course of four years, he completed the three remaining volumes of his history, which were published together in 1788. In 1793 he returned to England, where he died 16th January, 1794. His history, though not without its defects, has great merits. Its style, if at times somewhat stiff and pompous, has the energy and elevation required for so great a theme; his learning is vast and thorough, and his insight into human nature in every variety of circumstances in remote countries and epochs is that of a great and philosophical historian. In 1796 his friend Lord Sheffield published two quarto volumes of his miscellaneous works, of which the most valuable part is the Memoirs of his Life and Writings.

Gibbons, ORLANDO, English musical composer, born in 1583, died in 1625. At the age of twenty-one he was appointed organist of the Chapel Royal, and in 1622 he received the degree of Doctor of Music from the University of Oxford. Three years later he died of small-pox at Canterbury, where he had gone to be present at the marriage of Charles I. with Henrietta of France. He was buried in Canterbury Cathedral, where his wife caused a magnificent tomb to be erected to him. He is the author of Madrigals and Anthems (Hosanna to the Son of David! Almighty and Everlasting God! &c.).

Gibel (jib'el), a fish of the carp genus, *Cyprinus gibelio*, generally known in England as the Prussian carp, and belonging to that section of the genus having no barbules at the mouth. It is a good table fish, but seldom weighs more than ½ lb. It is said to be able to live so much as thirty hours out of water.

Gibeon, one of the ancient royal cities of the Canaanites, a 'great city' of the Hivites, who at an early stage of Joshua's conquests, by disguising themselves in old clothes and professing to come from a far country, obtained an alliance and covenant with the Israelites. When the stratagem was discovered, the Israelites resolved to observe the covenant, but condemned them to be 'hewers of wood and drawers of water unto all the congregation' (Jos. ix. 21). It was during the battle here between Joshua and the five kings of the Amorites that the sun 'stood still upon Gibeon, and the moon in the valley of Ajalon.' Gibeon has been identified with the modern El-Jib.

Gibraltar (jib-ral'tar), a town and strongly-fortified rocky peninsula near the southern extremity of Spain, belonging to Great Britain. It is connected with the mainland by a low sandy isthmus, 1½ mile long and ¾ mile broad, known as the 'neutral ground,' and has Gibraltar Bay on the west, the open sea on the east and south. The highest point of the rock is about 1400 feet above sea-level; its north face is almost perpendicular, while its east side exhibits tremendous precipices. On its south side it is almost inaccessible, making approach from seaward impossible; the west side, again, although very rugged and precipitous, slopes

towards the sea; and here the rock is secured by extensive and powerful batteries, rendering it apparently impregnable. Vast sums of money and an immense amount of labour have been spent in fortifying this celebrated stronghold, which, as a coaling station, depôt for war material, and a port of refuge in case of war, would form one of the most important points of support for British naval operations and British commerce eastwards. Numerous caverns and galleries, extending 2 to 3 miles in length, and of sufficient width for carriages, have been cut in the solid rock, with port-holes at intervals of every 12 yards bearing upon the neutral ground and the bay, and mounted with more than 1000 guns, some of them of the largest size. The garrison numbers about 5000. The town of Gibraltar is situated on the west side of the peninsula, terminating in Europa Point, and thus fronts the bay. It consists chiefly of one spacious street about ½ mile in length, lined with shops, and paved and lighted. The principal buildings are the governor's and lieutenant-governor's houses, the admiralty, naval hospital, victualling office, and barracks, and a handsome theatre. Its water supply is derived from the rainfall. Gibraltar is a free port, and has a considerable shipping trade, being an entrepôt for the distribution of British manufactures. The chief export is wine. The administration is vested in the governor, who is also commander-in-chief of the troops. Every precaution is taken to prevent the immigration into the town of new residents. The civil population amounts to about 18,000.—Gibraltar, known to the Greeks as Calpe, was first fortified as a strategic point by the Saracen leader Tarik Ibn Zeiad in 711–12, from whom it was thenceforward called Gebel-al-Tarik, the rock of Tarik. It was ultimately taken by the Spaniards from the Moors in 1462, fortified in the European style, and so much strengthened that the engineers of the 17th century considered it impregnable. It was taken, however, after a vigorous bombardment in 1704 by a combined English and Dutch force under Sir George Rooke and Prince George of Darmstadt, and was secured to Britain by the Peace of Utrecht in 1713. Since then it has remained in British hands, notwithstanding some desperate efforts on the part of Spain and France to retake it. In 1704–5 it was closely besieged; in 1727 it was hard pressed by a Spanish force when Admiral Wager, with eleven ships of the line, relieved it. In 1779, Britain being then engaged in a war with its revolted colonies and with France, a last grand effort was made by Spain to recover Gibraltar. The siege lasted for nearly four years, the fire being for the great part of that time very harassing, and rising on several occasions into a fierce and prolonged bombardment. It was heroically and successfully defended, however, by General Elliot (afterwards Lord Heathfield) and the garrison. Since that time, in the various British and Spanish, and also French wars, Gibraltar has only been blockaded on the land side.

Gibraltar, STRAITS OF, the channel which forms an entrance from the Atlantic into the Mediterranean. The narrowest part is a little to the west of Gibraltar, and 8½ miles across. A strong and constant current flows into the Mediterranean from the Atlantic Ocean, in the middle of the Straits, but the undercurrent as well as two feeble lateral currents along the coast set towards the ocean.

Gibson, JOHN, one of the most distinguished English sculptors of modern times, born near Conway, in Wales, in 1790, died at Rome in 1866. He was the son of a landscape-gardener, and was apprenticed to a wood-carver at Liverpool, where he attracted attention by a figure of Time modelled in wax which he exhibited at the age of eighteen. The patronage of Mr. W. Roscoe assisted him to go to Rome, where he was cordially received by Canova. On the death of Canova in 1822 Gibson entered the studio of Thorwaldsen. His reputation was now widely spread, and his works were eagerly sought after by his countrymen. In 1836 he was made a Royal Academician; but to the end of his life he continued to make Rome his chief place of residence. Most of Gibson's subjects are taken from classical mythology, and are executed with a noble severity and purity of style. Amongst his best works are: The Wounded Amazon; The Hunter and his Dog; Hylas and the Nymphs, Helen, Proserpine, Sappho, &c. One of his peculiarities as an artist was the practice of colouring his statues.

Gibson, THOMAS MILNER, English politician, born 1807, died 1884. He was educated at Cambridge; returned in 1837 as Conservative member for Ipswich; afterwards converted to Liberalism; became an orator of the Anti-Corn-Law Movement; returned for Manchester in 1841; vice-president of the Board of Trade under Lord John Russell; lost his seat at Manchester

in 1857 on account of opposition to Crimean War; returned for Ashton-under-Lyne; president of Board of Trade from 1859 to 1866.

Gideon (Hebrew, meaning a destroyer), the son of Joash, of the tribe of Manasseh, divinely called to deliver the Israelites from the oppression of the Midianites. Having effected their deliverance he was chosen judge of Israel. See Judges vi.–viii.

Giers (gērz), NICHOLAS CARLOVITCH DE, a Russian statesman descended from a Swedish family settled in Finland, was born in 1820. After holding various posts, in 1875 he became adjunct to Prince Gortschakoff, the minister of foreign affairs, whom he succeeded in 1882. His policy in general was of peaceful tendencies, and in particular opposed to Panslavistic ideas of development. In Central Asia, however, he continued the policy of advance, and in 1885 the Russian occupation of positions within the Afghan frontier nearly brought about a war with Britain. He died in 1895.

Giessen (gē'sėn), a town of Germany, capital of the province of Upper Hesse, in the Grand-duchy of Hesse-Darmstadt, on the Lahn. It was once fortified, and is still entered by four gates, but its ramparts have been converted into pleasant walks. It has a castle, now converted into government offices, and a university founded in 1607, and possessing valuable apparatus, an observatory, and a botanical garden. Pop. 19,001.

Gifford, WILLIAM, a critic and satirist, born at Ashburton, in Devonshire, in 1757. He was apprenticed to a shoemaker, but possessing a strong taste for study he was enabled by the kindness of some friends to go to school and afterwards to Oxford University. After being some time tutor in Earl Grosvenor's family he published in 1794 The Bæviad, a satire directed against the poetasters of the Della Crusca school; and in 1795 The Mæviad, a severe satire on the contemporary drama. In 1797 he became editor of the Anti-Jacobin; and he published a translation of Juvenal in 1802. On the foundation of the Quarterly Review in 1809 he became its editor, conducting it with much ability. He also edited the works of Massinger, Ford, Jonson, and Shirley. He died in 1826, and was interred in Westminster Abbey.

Gifford Lectures, lectureships endowed by Lord Gifford, one of the judges of the Court of Session, Edinburgh, from 1870 to 1881, who left £80,000 for the purpose. They were founded in connection with the Universities of Edinburgh, Glasgow, Aberdeen, and St. Andrews, and are for the exposition of natural religion in the widest sense of that term: the lecturers to be subjected to no test of any kind: to belong to any denomination whatever, or to no denomination. The appointments are for two years, but may be held for six. The lecturers are to deliver a yearly course of about twenty original lectures open to all. The first lecturers were: Glasgow, Max Müller; Edinburgh, Hutchinson Stirling; St. Andrews, Andrew Lang; and Aberdeen, E. B. Tylor.

Gijon (*hē-hōn'*), a seaport in Spain, on the Bay of Biscay. It consists of an old and a new town, the former on the upper part of a slope and the latter below. It contains a cigar manufactory, employing about 1400 persons, and has various other industries and a good trade. Pop. 35,170.

Gila (jē'lȧ), RIO, a North American river, which rises in New Mexico and flows westward for 450 miles, and then unites with the Colorado. Curious ruins of stone-built houses occur all along its banks. In these are found fragments of pottery.

Gilbert, SIR HUMPHREY, English navigator of the reign of Queen Elizabeth, born in Devonshire about 1539. In 1578 he obtained from the queen a patent, empowering him to discover and colonize in North America any land then unsettled, and made an unsuccessful voyage to Newfoundland. In 1583 he sailed to it again, and took possession of the harbour of St. John's. Shortly after he embarked in a small sloop to explore the coast, and was lost in a storm.

Gilbert, SIR JOHN, R.A., English painter, born in 1817. He first exhibited in 1836. His first notable work was The Arrest of Lord Hastings by the Protector Richard, Duke of Gloucester, in water-colour. He has also painted in oil, and among his more notable productions in that branch of the art are Don Quixote giving Advice to Sancho Panza, The Education of Gil Blas, and a series of tableaux of the principal characters in Shakspere. He possesses especial merit in depicting old English scenes. He was the most prominent artist engaged on the Illustrated London News for a number of years after its commencement in 1842, and during the same period did a great amount of book illustration. In 1871 he became president of the Society of Water-Colours. In the same year he was knighted, and in

1872 he became an A.R.A., becoming R.A. in 1876. He died in 1897.

Gilbert, WILLIAM SCHWENK, English dramatist, born in London in 1836. In 1857 he became a clerk in the Education Office; in 1862 he was called to the bar, but he has since devoted his time almost exclusively to literature. In 1875 he entered into partnership with Arthur Sullivan the composer, and in conjunction with him produced a series of comic operas, Trial by Jury (1876), H.M.S. Pinafore (1878), The Pirates of Penzance (1880), Patience (1882), Iolanthe (1883), Princess Ida (1884), The Mikado (1885), The Yeomen of the Guard (1888), The Gondoliers (1889), Utopia, Limited (1893).

Gilbertines, an order of monks founded in England by Gilbert of Sempringham in the 12th century. They followed the Augustinian rule, and their numerous monasteries were suppressed by Henry VIII. There were also Gilbertine nuns.

Gilbert Islands, or KINGSMILL GROUP, a group of sixteen islands in the Pacific Ocean, on the Equator, between lon. 172° 0′ and 174° 30′ E. under British protection; area 166 sq. miles. They are of coral formation, and all low and not fertile. Their chief products are mostly the cocoa-nut, pandanus, taro, and the bread-fruit tree. The islanders are a handsome people of mixed blood. The women are much smaller in proportion than the men, with delicate features and slight figures. Pop. 35,000, some of them Christians.

Gilbo'a (Hebrew, 'Bubbling Fountain'), a range of hills in Palestine, bounding the plain of Esdraëlon on the N.E. One of them is identified with the ancient Gilboa, the scene of Saul's last fatal battle (1 Sam. xxix. 1).

Gild, a corporation. See *Guild*.

Gildas (gil'das), THE WISE (SAPIENS), a British ecclesiastic and historian of the 6th century, of whom little is known. There is extant a Latin treatise or diatribe ascribed to Gildas which bears the title of Epistola de Excidio Britanniæ (on the Destruction of Britain), but the violent invective which it employs against the Britons has led to doubts respecting its authenticity.

Gilding is the art of applying gold-leaf or gold in a finely-divided state to surfaces of wood, stone, or metals, a very ancient art, being practised among the Egyptians, Greeks, Romans, and Ancient Persians. The processes employed at the present day are very varied. Metals are gilded either by what is called chemical gilding, mercurial gilding, by electro-gilding (see *Electro-Metallurgy*), or by the application of gold-leaf. Copper and brass, for instance, may be gilded by the process called *wash* or *water gilding*, with an amalgam of gold and mercury. The surface of the copper, freed from oxide, is covered with the amalgam, and afterwards exposed to heat till the mercury is driven off, leaving a thin coat of gold. Gilding is also performed by dipping a linen rag in a saturated solution of gold, and burning it to tinder, the black powder thus obtained being rubbed on the metal to be gilded, with a cork dipped in salt water, till the gilding appears. Iron or steel is often gilded by applying gold-leaf, after the surface has been well cleaned, and heated until it has acquired the blue colour which at a certain temperature it assumes. Several leaves of gold are thus applied in succession, and the last is burnished down cold. One process of chemical gilding is by dipping the article into a solution of gold, what is termed Elkington's solution being composed as follows:—5 oz. (troy) of fine gold; nitro-muriatic acid, 52 oz. (avoirdupois); dissolve by heat, and continue the heat until the cessation of red or yellow vapours; decant the clear liquid; add 4 gals. of distilled water, pure bicarbonate of potassa 20 lbs., and boil for two hours. Gilding on wood, plaster, leather, parchment, or paper, is performed by different processes of mechanical gilding. The first of these is oil-gilding, in which gold-leaf is cemented to the work by means of oil-size. In the case of paper or vellum the parts to be gilt receive a coat of gum-water or fine size, and the gold-leaf is applied before the parts are dry. They are afterwards burnished with agate. Lettering and other gilding on bound books are applied without size. The gold-leaf is laid on the leather and imprinted with hot brass types. Brass rollers with thin edges are employed in the same way for lines, and similar tools for other ornaments. When the edges of the leaves of books are to be gilt they are first cut smooth in the press, after which a solution of isinglass in spirits is laid on, and the gold-leaf is applied when the edges are in a proper state of dryness. Japanner's gilding is another kind of mechanical gilding, which is performed in the same way as oil-gilding, except that instead of gold-leaf a gold dust or powder is employed. Frames of pictures and mirrors, mouldings, &c., are gilt by the application of gold-leaf, or by the cheaper

process of 'German gilding,' that is, by tin-foil or silver-leaf, with a yellow varnish above. Porcelain and other kinds of earthenware, as well as glass, may be gilt by fixing a layer of gold in a powdered state by the action of fire. The gold-dust or powder required in this operation may be obtained by precipitating it from a solution in aqua regia, either by means of sulphate of iron or proto-nitrate of mercury. In order that the gold powder may be applied to the surface of the article to be gilt it must be well mixed with some viscous vehicle, such as strongly-gummed water. It is then laid on with a fine camel's-hair brush.

Gil'ead, a mountain region on the east of Palestine, having Bashan on the north and Moab and Ammon on the south. It was noted for its balm, as well as for its pasturage.

Giles (jīlz), St. (*St. Ægidius*), a native of Greece, who, according to the legend, lived in the 6th century, and was descended from an illustrious family. He is said to have worked miracles, and founded a convent in France. He became patron saint of Edinburgh. His festival falls on the 1st of September.

Giles, St., name of a parish in London, with which is incorporated that of St. George, Bloomsbury, both in the borough of Finsbury. The wretchedness of St. Giles is often contrasted with the luxury of St. James in London.

Gilfil'lan, George, writer, born in 1813, died in 1878. He studied at Glasgow University, in 1835 he became a licentiate of the Secession (Presbyterian) Church, and in 1836 was ordained to the School Wynd Church, Dundee. His numerous writings, among which may be mentioned A Gallery of Literary Portraits, and The Bards of the Bible, possess a vigorous style and great powers of fancy.

Gilfil'lan, Robert, Scottish poet, born in Dunfermline 1798, died 1850. He learned to be a cooper, and after trying one or two other trades he was latterly collector of police rates in Leith. He has some reputation as a song-writer, his subjects being chiefly of a domestic cast. In 1831 he published a small volume entitled Original Songs. Enlarged editions appeared in 1835 and 1839.

Gilghit, or Gilgit (gil'git), a valley and district in Cashmere state, situated on the southern slope of the Hindu Kúsh, and watered by the Gilgit, or Yasm, a tributary of the Indus.

Gill (jil), a measure of capacity equal to $\frac{1}{4}$ of a pint, and $\frac{1}{32}$ of a gallon.

Gilles (zhēl), St., a town in Southern France, dep. Gard, in a country rich in vineyards. Pop. 5268.

Gillies (gil'iz), John, Scottish historian and scholar, born at Brechin in 1747, died at Clapham in 1836. He was educated at the University of Glasgow, and finally settled in London, where he applied himself to literature. He published the Orations of Lysias and Isocrates, translated from the Greek; History of Ancient Greece; a translation of Aristotle's Ethics and Politics, with other works upon Aristotle; and a View of the Reign of Frederick II. of Prussia.

Gillray', James, an English caricaturist, born in 1757, died in London in 1815. He studied at the Royal Academy, and some clever sketches, published about 1780, first attracted attention to him. From this time till about 1810 he kept his position before the public by a succession of caricatures in which the king (George III.) and the members of the House of Lords, and afterwards the French and the French celebrities of the day, were the chief objects of ridicule. In his closing years he was attacked by a mental malady which continued till his death.

Gills, the respiratory organs of animals which respire by obtaining oxygen from water, as crustaceans, molluscs, fishes, and amphibians. In fishes they consist of cartilaginous or bony arches attached to the bones of the head, and furnished on the exterior convex side with a multitude of fleshy leaves or fringed vascular fibrils resembling plumes, and of a red colour in a healthy state. The water is admitted by the gill-opening, and acts upon the blood as it circulates in the fibrils.

Gillyflower (jil'i-), a name bestowed on such cruciferous flowers as the wall-flower or carnation, &c. The clove-pink (*Dianthus Caryophyllus*) is termed clove gillyflower.

Gilo'lo, Jilolo, an island in the Indian Archipelago, the largest of the Moluccas; area, 6500 square miles. It is of singular form, consisting of four peninsulas, radiating N., N.E., E.S.E., and S., from a common centre, and having large bays between. It is rugged and mountainous, the mountains being volcanic. The principal productions are sago, cocoa-nuts, spices, fruits, edible birds'-nests, useful timber, &c.; horses, cattle, and sheep abound. Deer, wild boars, and other game are likewise plentiful. The original

inhabitants, called Alfoories, have been gradually pressed into the interior by the Malays. The greater part of Gilolo is under the Sultan of Ternate; pop. 23,000; the other is nominally under the Sultan of Tidor, pop. about 4500.

Gil Polo. See *Polo.*

Gilthead (*Chrysophrys aurāta*), an acanthopterygious fish of the Sparidæ or sea-bream family common in the Mediterranean. It has strong grinding teeth for crushing the shells of the molluscs on which it feeds; a yellow band stretches from eye to eye (whence its generic name, signifying, 'golden eye-brows'). Its colour is a mixture of silver and sky-blue, its dorsal and caudal fins are black, while brown lines pass along the sides. It is a fine fish, and sometimes reaches a weight of 18 to 20 lbs.

Gilt Toys, the trade term for trinkets of copper or German-silver, with a thin coating of gold or silver spread over its surface. Gilt toys are thus cheaper than gold and silver jewelry, but they may be equally brilliant and as little liable to tarnish. In Britain this industry is chiefly carried on at Birmingham; and in France at Paris and Lyons.

Gimbals (gim'balz), the name of the pair of rings within which the mariner's compass is slung, or any pair of similar rings. The gimbals maintain the compass-bowl and the compass-card in a horizontal position, there being two concentric rings, the outer turning about a horizontal axis, and the inner turning about a similar axis at right angles to the other. Ship chronometers are often suspended the same way.

Gimlet, a small tool with a pointed screw at the end, used for boring holes in wood or other substances by turning. A larger instrument of this nature is termed an *auger.*

Gimp (gimp), a silk, woollen, or cotton twist stiffened by a fine wire, or sometimes a coarse thread running through it, and much used in trimmings for dresses, &c.

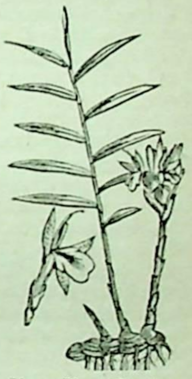
Gin, a spirit distilled from grain, and flavoured with juniper-berries, and sometimes with oil of turpentine and common salt, and other substances. The name is from *genièvre*, the French for 'juniper.' It is largely manufactured in Holland, particularly in Schiedam, and the gin thence imported is thus often called Schiedam as well as Hollands. In Great Britain gin is largely manufactured in London, where it often goes by the name of *Old Tom*, and to a less extent at Plymouth and Bristol. What is termed 'gin' in Great Britain differs materially from Hollands and even from the best English gin, as it is a plain corn spirit, which derives its flavour from oil of turpentine, with certain aromatics in small quantities.

Gin, the name of certain machines employed in raising weights. One form consists of three poles, 12 to 15 feet long, often tapering from the lower extremity to the top and united at their upper extremities, whence a block and tackle is suspended. A space of 8 or 9 ft. separates the lower extremities planted in the ground, and a kind of windlass is attached to two of the legs. Another kind of gin is a sort of whim or windlass for raising coal, &c. It is worked by a horse, which turns a cylinder, and winds on it a rope, by which the weight is raised.

Gingal, (jin'gal), a kind of large musket used in some parts of Asia. It is fired from a rest, and may be mounted on a light carriage.

Gingelly Oil (jin-jel'i). See *Benné Oil.*

Ginger (*Zingiber officinālc*), an East Indian plant of the order Zingiberaceæ. It grows in moist places in various parts of tropical Asia and the Asiatic islands, and has been introduced into the West Indies, particularly Jamaica, as also into S. America and W. Africa. The kind most esteemed is Jamaica ginger. The rhizome, or underground stem, is what is used, being employed in various ways. It has an aromatic, pungent taste, and when young is candied, and makes an excellent preserve. It is a favourite condiment, and is used medicinally as a carminative, and in debility of the stomach and alimentary canal. It is often useful in cases of toothache, relaxation of the uvula, and paralytic affections of the tongue. It enters into the composition of a great number of confections, infusions, pills, &c. The special preparations are the *tincture* and the *essence* of ginger; *syrup*, prepared by mixing twenty-five parts of syrup with one of the strong tincture. *In-*



Ginger Plant (*Zingiber officinale*).

fusion of ginger is a preparation useful for flatulence.

Ginger-ale, an aërated water made in the same way as lemonade, but flavoured with ginger instead of lemon.

Ginger-beer, a pleasant, non-alcoholic, effervescing beverage, made by mixing together ginger, cream of tartar, sugar, yeast, and water, and allowing the whole to ferment for a time, then bottling. Ginger-beer may also be prepared thus: Add to each gallon of water 1 lb. of refined sugar, and ½ oz. of ground ginger. Boil for an hour, add the white of two eggs, remove the scum. Strain into a vessel to cool, cask it up with the juice and peel of a lemon. Add a very small amount of brewer's yeast, and bung up tightly for a fortnight.

Ginger-bread, a well-known cake made in many ways, the chief ingredients being flour and treacle, with ginger, butter, eggs, &c.

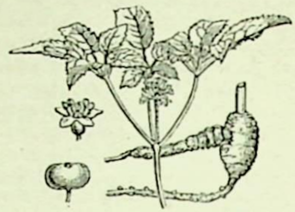
Ginger-cordial, or GINGER-WINE, a beverage made from raisins, lemon rind, ginger, sugar, and water, with some whisky or brandy.

Gingham (ging'am), a cotton fabric distinguished from calico by having the colours woven with the fabric, not printed on it. The patterns are various; sometimes fancy designs, sometimes chequered, and sometimes striped. Umbrella ginghams are all of one colour.

Gingko, the Japanese name of coniferous trees of the genus *Salisburia* belonging to the yew family. The *Salisburia adiantifolia* is a tree which sometimes rises nearly 100 feet in height. It is destitute of resin. It is a native of China and Japan, and was introduced into Europe in 1754, when it was brought to England. Its fruit incloses a kernel which, when roasted, may be used as food, and which tastes like maize.

Ginsburg (gins'bu̦r*h*), CHRISTIAN D., rabbinical scholar, born at Warsaw in 1830. He is the author of Historical and Critical Commentary on the Song of Songs; The Karaites, their History and Literature; The Essenes; The Kabbalah, its Doctrines, Development, and Literature, and other works of similar character. His greatest work is, however, the Massora. He was one of the scholars engaged on the revised version of the Old Testament.

Ginseng (jin'seng), a plant of Northern Asia, *Panax schinseng*, order Araliaceæ, herbaceous, and about 1 foot high. Its root is regarded as a sort of panacea among the Chinese, and is largely imported, but it appears to be really of very little efficacy; the taste is sweet and mucilaginous, accompanied with some bitterness, and also slightly aromatic. Another species of gin-



American Ginseng (*Panax quinquefolium*).

seng, *Panax quinquefolium*, inhabits Canada and the north-eastern parts of the United States. Quantities of its root are sent to China.

Gioberti (jō-ber'tē), VINCENZO, an Italian philosopher and statesman, born at Turin 1801, died at Paris 1852. Having been educated for the church, he was appointed chaplain to Charles Albert, king of Sardinia, but having rendered himself obnoxious by his republican sentiments, he was first imprisoned, and, in 1833, banished. The first few years of his exile he spent at Paris, and afterwards became a teacher of philosophy in a school at Brussels. There he published two works, one of which was an attempt to reconcile philosophy and Roman Catholicism. In 1843 appeared his Primato Morale e Civile degli Italiani, a defence on liberal principles of the Papacy, a work which brought over the majority of the priests to the national party. In 1847 he published a work entitled Il Gesuita Moderno (the Modern Jesuit). When Charles Albert in 1848 granted a constitution to Sardinia, Gioberti returned to his native country, but he soon after withdrew to Paris.

Giobertine Tincture, a preparation for restoring illegible writings or faded pictures. The inventor of it was Giovanni Antonio Gioberti (1761–1824), a native of Piedmont.

Gioja Del Colle (jō'yä del kol'lā), a town in Southern Italy, province of Bari, on a slope of the Apennines. Pop. 17,066.

Giordano (jor-dä'nō), LUCA, Italian painter, born at Naples about 1632, a scholar of Spagnoletto, studied the great Italian masters at Rome, and became the pupil of Peter of Cortona. Paul Veronese had afterwards great influence on his manner. He imitated the greatest masters so well that

even connoisseurs were imposed upon. In 1679 he was employed by Charles II. to ornament the Escurial, and at the court of Spain he became a great favourite. Giordano was especially successful in imitating the manner of Bassano, and of the Chevalier Massimo Stanzioni. After the death of Charles II. he returned to his native country, where he died about 1705. His most celebrated pieces are his frescoes, in the Escurial, at Madrid, Florence, and Rome. Some of his finest paintings are at Dresden.

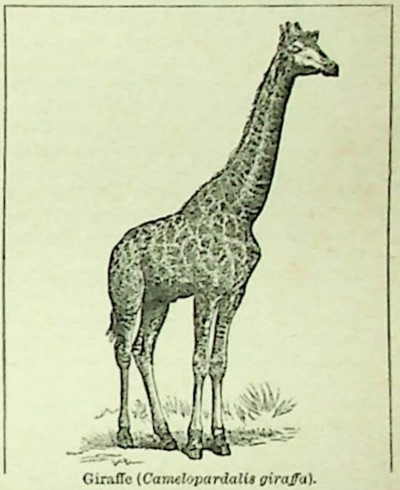
Giorgione (jor-jō′nā), properly GIORGIO BARBARELLI, born in 1477 at Castelfranco, one of the most celebrated painters of the Venetian school. In Venice he ornamented the façades of several large buildings with frescoes, which have mostly perished. He found in Titian a formidable rival in this branch of his art. His portraits are reckoned among the finest of the Italian school. His pieces are rare, but some are to be seen at Milan, and in the galleries at Vienna and Dresden. He died in 1511.

Giotto (jot′tō), properly AMBROGIOTTO or ANGIOLOTTO BONDONE, a celebrated Italian painter. He was born probably about 1276, at the Florentine village of Vespignano, and in his boyhood tended cattle. But having been seen by Cimabue, as he was drawing figures of his sheep upon a piece of slate, that artist carried him to Florence and taught him painting. His natural talent and gracefulness developed so rapidly that he soon surpassed all his contemporaries. He represented human figures with truth and nature, and surpassed all others in the dignity and pleasing arrangement of his figures, and a regard to the proportions and disposition of the drapery. His figures have more life and freedom than those of Cimabue, as he particularly avoided the stiff style. Among his most celebrated pieces is the Navicella (ship), at Rome (a picture of Peter Walking upon the Waves), some fresco paintings at Florence, also the history of St. Francis, at Assisi, and several miniatures. He was equally successful as a statuary and architect. He died in 1336.

Giovinazzo (jō-vē-nát-sō), a seaport of South Italy, province of Bari, on the Adriatic, the seat of a bishop. Pop. 9797.

Gipsy. See *Gypsies.*

Giraffe (ji-raf′; *Camelopardălis giraffa*), a ruminant animal inhabiting Africa, and constituting the only species of its genus and family. It is the tallest of all animals, a full-grown male reaching the height of 18 or 20 feet. This great stature is mainly due to the extraordinary length of the neck, in which, however, there are but seven vertebræ, though these are extremely elongated. It has two bony excrescences on its head resembling horns. Its great height is admirably suited with its habit of feeding on the leaves of trees, and in this the animal is further aided by its tongue, which is both prehensile and capable of being remarkably elongated or contracted at will. When it browses the herbage on the ground it



Giraffe (*Camelopardalis giraffa*).

stretches out its fore-legs as wide as possible till it can reach the ground by means of its long neck. Its colour is usually light fawn, marked with darker spots. It is a mild and inoffensive animal, and in captivity is very gentle and playful. The giraffe is a native of a great part of Africa, from Abyssinia and Sennaar to Senegal and the regions adjacent to the Cape Colony.

Giral′dus Cambren′sis, an early English historian, born about 1146. His proper name was Gerald de Barry, and he was son of William de Barry, a Norman noble of Pembrokeshire. He was educated under his uncle, the Bishop of St. David's, and afterwards at the University of Paris. He returned in 1172, and was appointed Archdeacon of St. David's. His uncle dying soon after, Gerald was elected to succeed him, but the king refused to confirm the appointment, and Gerald withdrew to Paris, where he was appointed professor of canon law. In the following

year (1180) he returned to England, where he was required to administer the bishopric of St. David's, the proper bishop having proved himself incompetent. He discharged this office for four years, and was then appointed a royal chaplain. As companion to the king's son, Prince John, he went to Ireland in 1185, where he collected the materials for his Topography of Ireland (Topographia Hiberniæ). He afterwards drew up a similar work on Wales (Itinerarium Cambriæ). After the departure of Richard Cœur de Lion for Palestine, Gerald remained to conduct the affairs of the government, but in 1192 retired to Lincoln for purposes of study. He was again elected to the see of St. David's, but Richard prevented his installation. He now retired from the world, and refused the bishopric when again offered to him. The year of his death is unknown. He was a person of great vanity and ambition, and was also remarkable for his credulity. The De Rebus a se Gestis, which, with others of his minor works, is published in Wharton's Anglia Sacra, contains the most remarkable instances of the author's vanity and self-esteem.

Girardin (zhē-rär-daṇ), ÉMILE DE, French journalist and politician, born in Switzerland in 1802, and educated in Paris. He was connected as projector, editor, or otherwise with a number of newspapers and periodicals, the most successful being La Presse, a Conservative organ established in 1836. A controversy in its columns led to a duel between Girardin and Armand Carrel, which proved fatal to the latter. In politics Girardin played many parts. He was fined 5000 francs in 1867 for attacks on the imperial government in La Liberté. He wrote numerous political pamphlets, and a few pieces for the stage. He died in 1881.—His first wife, Delphine Gay, daughter of the novelist Madame Sophie Gay, was a well-known authoress; born 1804, died 1855. She wrote the novels Le Lorgnon, Le Marquis de Pontanges, La Canne de M. de Balzac, Il ne faut pas jouer avec Douleur, and Marguerite; contributed to the Presse newspaper, and wrote for the stage Lady Tartuffe and La Joie fait peur, and other pieces.

Girasol (ji'ra-sōl), a precious opaline stone, which, under strong lights, reflects a brilliant reddish light. It is usually of a milk-white or bluish-white colour. The brightest are brought from Brazil and Siberia. The name is sometimes bestowed on the Asteria sapphire. One variety is known as the fire opal.

Girder, a main beam, either of wood or iron, resting upon a wall or pier at each end, employed for supporting a superstructure, or a superincumbent weight, as a floor, the upper wall of a house when the lower part is sustained by pillars, the roadway of a bridge, and the like. Wooden girders are sometimes cut in two longitudinally and an iron plate inserted between the pieces, and the whole bolted together. This species of girder is called a *sandwich-girder*. For bridges cast-iron girders are sometimes cast in lengths of 40 feet and upwards, but when the span to be crossed is much greater than 40 feet, recourse is had to wrought-iron, or to *trussed*, *lattice*, or *box girders*, and cast-iron is now little used. A *trussed-girder* is a wooden girder strengthened with iron. A *lattice-girder* is a girder consisting of two horizontal beams united by diagonal crossing bars, somewhat resembling wooden lattice-work. A *box-girder* is a kind of girder resembling a large box, such as those employed in tubular bridges. There are also *bowstring-girders*, which are varieties of the lattice-girder, and consist of an arched beam, a horizontal tie resisting tension and holding together the ends of the arched rib, a series of vertical suspending bars by which the platform is hung from the arched rib, and a series of diagonal braces between the suspending bars.

Girdle of Venus (*Cestum Veneris*), an animal belonging to the Ctenophora, found in the Mediterranean. In shape it resembles a ribbon, and it is apparently propelled by the cilia which fringe its edge. The mouth is situated on the inferior edge. It is iridescent by day, and brilliantly phosphorescent at night.

Girgeh (jir'je), town, formerly capital, of Upper Egypt, on the left bank of the Nile. It possesses a Roman Catholic convent, the oldest in Egypt. Pop. 10,000.

Girgenti (jir-jen'tē), a town in the south-west of Sicily, capital of the province of same name, 58 miles S.S.E. of Palermo, a few miles from the sea, on an elevated site, with a cathedral, library, museum, &c. It exports wheat, oil, fruit, and sulphur, its port being Porto Empedocle. Near the town are the extensive and remarkable ruins of the ancient Agrigentum. Pop. 19,380.—The province has an area of 1490 square miles, and is rather mountainous in character. Pop. 312,487.

Girodet-Trioson (zhē-ro-dā-trē-o-sōṇ), ANNE LOUIS GIRODET DE ROUSSY, French historical painter, born in 1767, died 1824. Among his famous pictures are Endymion, Hippocrates, The Deluge, Atala, Napoleon receiving the keys of Vienna, and St. Louis in Egypt.

Gironde (zhē-rōṇd), a department of France, on the Bay of Biscay, named from the Gironde estuary; area, 3610 square miles. The surface is generally flat, and almost the whole department belongs to the basin of the Gironde, which is formed by the junction of the Dordogne and Garonne. The climate is generally mild and extremely moist. One-third of the surface is waste, and about one-fourth is arable land. The staple production is wine, Médoc, Graves, Côtes, and Entre-deux-Mers being the most celebrated growths. (See *Bordelais Wines*.) The forests of oak and pine are extensive. The minerals are unimportant, but much salt is obtained from lagoons. The manufactures are varied; the trade, which has its centre at Bordeaux, is very important. Bordeaux is the capital. Pop. 775,845.

Gironde, RIVER. See *Garonne*.

Girondists (*Girondins*), one of the great political parties of the first French revolution. The Girondists were republicans, but were more distinguished for visionary ideals than for a well-defined policy; hence they fell an easy prey to the party of the Mountain. Their leaders were three of the deputies of the Gironde—Vergniaud, Guadet, and Gensonné, hence the name. Louis XVI. was obliged, in 1792, to select a ministry from among the Girondists, but it was short-lived. In the convention their struggles with the Montagnards forced them into extreme measures which they would otherwise have avoided. They wished to save the king, but many of them, from a mistaken policy, voted for his death. Their fall dates from their unsuccessful impeachment of Marat (1793), soon after which a large number of them were proscribed, and twenty-one of them were condemned and executed.

Girton College, Cambridge, the most noted college for women in England. Opened in 1869 at Hitchin, it was removed to Girton, and opened in 1873. Newnham Hall, Cambridge (opened 1875), is also connected with it. Candidates (sixty in number) must have attained their eighteenth year, and they are obliged to pass an entrance examination, held in London and other centres. The ordinary course consists of three years, or nine terms, one-half of each year being spent in the institution. The studies embrace the principal branches of university culture. The 'degree certificate' corresponds to the Cambridge B.A. degree; the 'college certificate' covers a somewhat different group of subjects.

Girvan (gir'van), a seaport of Scotland, county of Ayr, situated at the head of a fine bay, on the Girvan. The winter herring fishery is the most important industry. Pop. 4081

Gisors (zhē-sōr), a town of Northern France, department of Eure, with a well-preserved castle of the 12th century. Pop. 3500.

Gitschin (yit'shin), a walled town of North-eastern Bohemia, in a fine valley, on the Cidlina. It has a castle built by Wallenstein, whose residence it was. Pop. 8071.

Giulio Romano (jö'lē-ō rō-mä'nō), or GIULIO PIPPI, Italian painter, architect, and engineer, the most distinguished of Raphael's scholars, born at Rome near the end of the 15th century. During the lifetime of Raphael he painted with him and under his direction, and many of his productions are quite in his manner. After having finished the fresco-work in the Hall of Constantine in the Vatican at Rome, under Clement VII., he went to Mantua, where he executed a series of remarkable works in architecture, painting, and engineering. The Palazzo del T (palace of the T) was rebuilt and ornamented entirely by him, or under his direction. After the death of San Gallo in 1546 the building of St. Peter's was committed to him, but he died the same year. After the death of Raphael he gave himself up to his own imagination, and astonished all by the boldness of his style, by the grandeur of his designs, by the fire of his composition, by the loftiness of his poetical ideas, and his power of expression.

Giurgevo (jụr-jā'vō), a town in Roumania, on the Danube, opposite Rustchuk, the most important shipping port on the Roumanian side of the river. The Russians were defeated here by the Turks, 1854. Pop. 21,000.

Giusti (jụs'tē), GIUSEPPE, Italian satirical and political poet, born in 1809, died in 1850. He is considered by his countrymen as the rival of Béranger in popular lyrical poetry.

Givet (zhē-vā), town of North-eastern France, in the Ardennes, with leather manufactories and other industries. It is a place of great strategic importance, and its citadel

of Charlemont is of great strength. Pop. 7370.

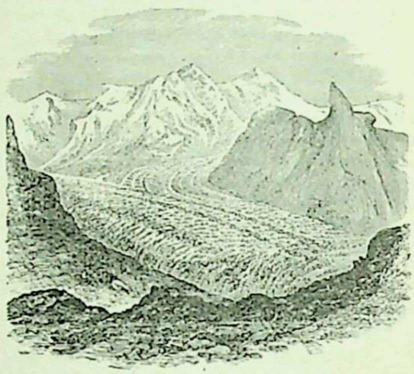
Givors (zhē-vōr), a town of South-eastern France, department of the Rhône, and on that river, a centre of the coal trade, with iron-works, glass-works, silk weaving and dyeing works, &c. Pop. 10,820.

Gizeh (gē′ze), a town of Egypt, on the left bank of the Nile, opposite Old Cairo. Some miles off are the celebrated pyramids, which have been named from it. Pop. 10,500.

Gizzard, a strong muscular part of the alimentary canal of birds, which enables them to grind their food. A gizzard occurs also in many gasteropods, and in certain cephalopods and crustaceans. In birds it is lined by a thick muscular coat, and usually contains pieces of gravel, &c., to facilitate the grinding process.

Glacial Period, or ICE AGE, in geology, denotes that portion of the post-tertiary period, in which Britain, Europe, and, in short, all parts of the Old and the New World north of latitude 50°–40° were subjected to intense cold, and covered with ice and glaciers. This phenomenon has been demonstrated from a study of the actual effects of glaciers in the Alps, &c. The traces of ancient glacial action are abundantly discoverable in the Highlands of Scotland, in England, in the Scandinavian range, the Jura, the Black Forest, &c. In Asia they are perceptible in the Himalaya, while N. America abounds with them. See *Geology*.

Glaciers, icy masses of great bulk, harder than snow, yet not exactly like common ice, which cover the summits and sides of mountains above the snow-line. They are found in Switzerland, Scandinavia, the Andes, &c. They extend down into the valleys often far below the snow-line, and bear a considerable resemblance to a frozen torrent. They take their origin in the higher valleys, where they are formed by the congelation and compression of masses of snow in that condition called by French writers *névé*, by German authors *firn*. The ice of glaciers differs from that produced by the freezing of still water, and is composed of thin layers filled with air-bubbles. It is likewise more brittle and less transparent. The glaciers are continually moving downwards, and not unfrequently reach the borders of cultivation. The rate at which a glacier moves generally varies from 18 to 24 inches in twenty-four hours. At its lower end it is generally very steep and inaccessible. In its middle course it resembles a frozen stream with an undulating surface, broken up by fissures or *crevasses*. As it descends it experiences a gradual diminution from the action of the sun and rain, and from the heat of the earth. Hence a phenomenon universally attendant on glaciers—the issue of a stream of ice-cold turbid water from their lower extremity. The descent of glaciers is shown by changes in the position of masses of rock at their sides and on their surface. A remarkable glacier phenomenon is that of *moraines*, as they are called, consisting of accumulations of stones



Glacier of Zermatt, Switzerland.

and detritus piled up on the sides of the glacier, or scattered along the surface. They are composed of fragments of rock detached by the action of frost and other causes. The fissures or crevasses by which glaciers are traversed are sometimes more than 100 feet in depth, and from being often covered with snow are exceedingly dangerous to travellers. One of the most famous glaciers of the Alps is the Mer de Glace, belonging to Mont Blanc, in the valley of Chamouni, about 5700 feet above the level of the sea. It is more especially, however, in the chain of Monte Rosa that the phenomena of glaciers are exhibited in their greatest sublimity, as also in their most interesting phases from a scientific point of view. Glaciers exist in all zones in which mountains rise above the snow-line. Those of Norway are well known, and they abound in Iceland and Spitzbergen. Hooker and other travellers have given accounts of those of the Himalaya. They are conspicuous on the Andes, while the Southern Alps of New Zealand rival in this respect the Alpine regions of Switzerland.

The problem of the descent of the glaciers is of extraordinary interest, and various theories have been put forward to account for it. It was shown by Professor J. D. Forbes, of Edinburgh, that a glacier moves very much like a river; the middle and upper parts faster than the sides and the bottom; and he showed that glacier motion was analogous to the way in which a mass of thick mortar or a quantity of pitch flows down in an inclined trough. His theory is known as the *viscous theory* of glaciers, which presupposes that ice is a plastic body, and this plasticity has been satisfactorily explained by Professor James Thomson of Glasgow by the phenomenon of the melting and refreezing of ice. Water, he discovered, when subjected to pressure, freezes at a lower temperature than when the pressure is removed. Consequently when ice is subjected to pressure it melts; if it is relieved of pressure the water again solidifies. Therefore if two pieces of ice are pressed together, they tend to relieve themselves by melting at their points of contact, and the water thus produced immediately solidifies on its escape. If ice is strained in any way it similarly relieves itself at the strained parts, and a similar regelation follows. This, when applied to the glaciers, gives a complete explanation of their plasticity. Pressed downwards by the vast superincumbent mass, the ice gradually yields. Melting and refreezing takes place at some parts, at others the gradual yielding at strained points goes on. In the latter process there is no visible melting, but there is the gradual yielding from point to point to the pressure above, and there is the transference relatively to each other of the molecules that constitute the, at first sight, solid mass. If, however, at certain points the strain is intense, the ice becomes extremely brittle. The latter fact disposes of Tyndall's objection to Forbes' theory, which was based on the fact that *crevasses* proved the brittleness, and not the viscosity of ice.

Glăcier Tables, large stones found on glaciers supported on pedestals of ice. The stones attain this peculiar position by the melting away of the ice around them, and the depression of its general surface by the action of the sun and rain. The block, like an umbrella, protects the ice below it from both; and accordingly its elevation measures the level of the glacier at a former period. By and by the stone table becomes too heavy for the column of ice on which it rests, or its equilibrium becomes unstable, whereupon it topples over, and falling on the surface of the glacier defends a new space of ice, and begins to mount afresh.

Glacis, in fortification, is the sloping surface of the outermost portion of a fortified line, descending from the parapet of the covered way to the level ground or open country in front. It must be so placed that the guns of the fort will rake it at every point.

Gladbach (Bergisch-) (berg'ish-glád-bà*h*), a town of Prussia, province of Rheinland, 8 miles north-east of Cologne. Pop. 8557.

Gladbach (Mönchen-) (meun'*h*en-glád-bà*h*), a town of Prussia, province of Rheinland, 16 miles west of Düsseldorf, with extensive manufactures of cotton and mixed cotton goods, &c. Pop. 49,268.

Gladia'tors, combatants who fought at the public games in Rome for the entertainment of the spectators. The first instance known of gladiators being exhibited was in B.C. 264, by Marcus and Decimus Brutus at the funeral of their father. They were at first prisoners, slaves, or condemned criminals; but afterwards freemen fought in the arena, either for hire or from choice; and latterly men of senatorial rank, and even women, fought. The regular gladiators were instructed in schools (*ludi*), and the overseer (*lanista*) purchased the gladiators and maintained them. Men of position sometimes kept gladiatorial schools and lanistæ of their own. The gladiators fought in the schools with wooden swords. In the public exhibitions, if a vanquished gladiator was not killed in the combat, his fate was decided by the people. If they wished his death, perhaps because he had not shown sufficient skill or bravery, they held up their thumbs; the opposite motion was the signal to save him. The victor received a branch of palm or a garland. The gladiators were classified according to their arms and mode of fighting; thus there were *retiarii* who carried a trident and a net (L. *rete*) in which they tried to entangle their opponent; *Thracians*, who were armed with the round Thracian buckler and a short sword; *secutores*, who were pitted against the *retiarii*; &c.

Gladi'olus, a genus of plants of the iris order, having a bulbous root with a reticulated covering, natives of Europe and N. Africa, but especially S. Africa. The leaves are ensiform, the flowers brilliantly coloured.

There are many species, some of them popular garden plants, others grown in hothouses.

Gladstone, Right Hon. William Ewart, a great British statesman, son of Sir John Gladstone, was born at Liverpool in 1809, and died at Hawarden in 1898. After some years at Eton he entered Christ Church, Oxford, in 1828, and graduated in 1831, with high honours. After leaving Oxford he spent six months in Italy. In 1832 the first Reform Act was passed, and Mr. Gladstone's public career commenced by his being



Right Hon. W. E. Gladstone.

returned for Newark, and when Peel assumed office in 1834 he accepted the post of Junior Lord of the Treasury. At this period he was a Tory, and as his party quickly went out it was not until 1841 that he again held any public office, in which year he became, under Peel, Vice-president of the Board of Trade and Master of the Mint. In 1842 great fiscal reforms were inaugurated, some of which were understood to be due to Mr. Gladstone. Having become President of the Board of Trade, he carried, in 1843, a measure for the abolition of restrictions on the exportation of machinery, and in 1844 he carried a railway bill, establishing cheap trains. He took part with Peel in the repeal of the corn-laws, a course which cost him his seat for Newark. In 1847 he was returned for Oxford University, and he then supported the bill for the removal of Jewish disabilities, the repeal of the Navigation Laws, &c. He now began to develop remarkable ability as a financier, and fiercely attacked Mr. Disraeli's Budget of 1852. The same year he became Chancellor of the Exchequer under the Earl of Aberdeen, a post which he also held for a short time in 1855 under Lord Palmerston. In 1858 he became High Commissioner Extraordinary to the Ionian Islands, and his Studies on Homer appeared about the same time. In 1859 he again took office as Chancellor of the Exchequer under Lord Palmerston. At the general election of 1865 Mr. Gladstone was returned for South Lancashire, and on the decease of Lord Palmerston he became the Liberal leader in the Commons in the Russell administration, still continuing to hold the Chancellorship of the Exchequer. The Government, being defeated on the reform question, went out in 1866, and Lord Derby came into power. In 1867 a Reform Bill, establishing household suffrage in burghs, was carried by the Conservatives, but to the final shape of it Mr. Gladstone and Mr. Bright materially contributed. In 1868 Mr. Gladstone succeeded in abolishing compulsory church rates, and he also carried his resolutions dealing with the Irish Church, but his Irish Church Suspensory Bill was rejected by the Lords. At the general election of 1868 he lost his seat for South Lancashire, but was returned by Greenwich. There being a great Liberal majority in the new parliament Mr. Disraeli was soon forced to resign, and Mr. Gladstone became premier. Next year he carried his bill for the disestablishment of the Irish Church, and in 1870 his Irish Land Act, the English Education Act being also passed. In 1871 army purchase was abolished by royal warrant. The Ballot Act and the Scottish Education Act were passed in 1872. Parliament was dissolved in 1874, and the Conservatives ousted Mr. Gladstone from office, as they had secured a good majority. During Lord Beaconsfield's tenure of office Mr. Gladstone denounced the Bulgarian atrocities, the Anglo-Turkish Treaty, and the Afghan War, and his speeches during his candidature for Midlothian greatly helped to render the government unpopular. In 1880 the general election reinstated Mr. Gladstone firmly into power (Midlothian being now his constituency), and his second Irish Land Bill became law in the following year. In 1882 a Prevention of Crimes and an Arrears Act for Ireland were passed, and in 1883 measures relating to bankruptcy, &c., were also carried. In 1884 the bill extending household suffrage to the counties was carried, and the Gladstone ministry fell the next

year. Lord Salisbury, who had formed an administration, got the Redistribution of Seats Bill passed, and under it took place the general election of 1885, Mr. Gladstone still continuing to represent Midlothian. Next year Lord Salisbury resigned after an adverse vote in the Commons. and Mr. Gladstone again came into power. He now introduced a Home Rule bill for Ireland (April 8, 1886). It failed to pass the Commons, and the result of the general election which followed was emphatically adverse to Mr. Gladstone's proposals. He had to make way for Lord Salisbury, but in 1892 he again became premier. After passing a Home Rule bill through the Commons he resigned office in 1894, and next year retired from political life. His works include The State in its Relations with the Church (1838); Studies on Homer and the Homeric Age; Juventus Mundi; Homeric Synchronism; Landmarks of Homeric Study; The Impregnable Rock of Holy Scripture, &c.

Glagolitic Alphabet, an ancient Slavonic alphabet, based on the Greek, and used in many old religious works, while in others the Cyrillian letters (which see) are employed.

Glair, the white of eggs, used as a varnish for preserving paintings. Bookbinders also use it for finishing the backs of books.

Glaisher, JAMES, F.R.S., born 1809, aeronaut and meteorologist, long connected with Greenwich Observatory, author of various books and papers. His balloon ascent of 37,000 ft. is the highest on record.

Glamor'gan, or GLAMORGANSHIRE, a county in South Wales; area, 547,070 acres. The north and north-east parts of the county are extremely mountainous, and often exhibit scenes of the most romantic beauty. The southern portion is comparatively level and very fertile, particularly the vale of Glamorgan. The climate in this part is remarkably mild, as snow does not lie long on the ground, and tender shrubs thrive in the open air. Glamorganshire belongs wholly to the basin of the Severn; and all its streams, of which the Taff is the largest, flow in a south direction. The cattle are reckoned among the best in Wales. The mineral wealth of Glamorganshire is of incalculable value. Its coal-fields, its stores of ironstone and limestone, are most extensive, and the ironworks of Dowlais and Cyfarthfa are among the largest in the world. The woollen manufacture is carried on to some extent. Principal towns—Cardiff, the capital; Merthyr-Tydfil, Swansea, and Neath. The county returns five members to the House of Commons. Pop. 687,218.

Glance, a name given to some minerals which possess a metallic or pseudo-metallic lustre; as *antimony glance*, *bismuth glance*, *cobalt glance*, &c.

Glance-coal. See *Anthracite*.

Glanders, one of the most formidable diseases to which horses are subject, indicated by a discharge of purulent matter from one or both nostrils, with a hard enlargement of the submaxillary glands. In acute glanders the discharge, by its copiousness, impedes respiration and ultimately produces suffocation. The disease is highly infectious, and may even be communicated to man by the purulent matter coming in contact with any part where the skin is broken. The disease is rarely if ever cured. See also the article *Farcy*.

Glands, a certain class of structures in animals, some of them forming organs which are the seat of an excretion, and provided with an excretory canal. In man there are two lachrymal glands, situated at the external angle of the eyes under the upper eyelid; six salivary, of which three are on each side, behind and under the lower jaw; two parotid, two submaxillary, two sublingual, two mammary, confined to the female (the breasts in women); the liver, the pancreas, the two kidneys, &c. The lymphatic glands, which take up and elaborate the lymph, are somewhat different from these in character; and still more different are certain other bodies so denominated, as the spleen, thymus, pineal, &c. Botanists have given the name of glands to small bodies observed upon the surfaces of plants, and many of which seem to secrete certain fluids.

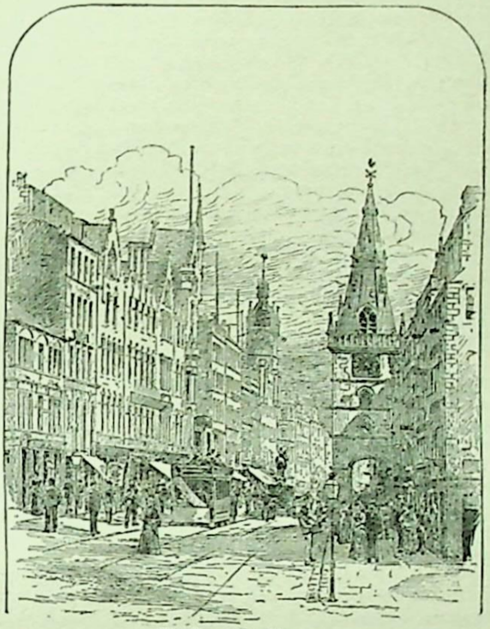
Glanvil, or GLANVILLE, RANULPH DE, English lawyer and warrior of the 12th century. In the reign of Henry II. he held the office of justiciary, and repelled the invasion of William the Lion, king of Scotland, who was taken prisoner as he was besieging the Castle of Alnwick. Richard I. is said to have imprisoned Glanvil, and obliged him to purchase his freedom with £15,000 towards a crusade to the Holy Land. He accompanied his master on this expedition, and perished at the siege of Acre in 1190. To Glanvil is attributed a treatise on the laws and customs of England (de Legibus et Consuetudinibus Angliæ), written about 1181, and first printed in the year 1554, being the earliest treatise on English law.

Glarus (glä'rös), a Swiss canton, surrounded by St. Gall, the Grisons, Uri, and Schwyz, area 266 sq. miles. On all sides, except towards the north, Glarus is walled in by lofty mountains; lakes are numerous, and the scenery in their neighbourhood is magnificent. The inhabitants are chiefly engaged in the cotton manufacture and in agricultural pursuits, rearing sheep and cattle, and exporting cheese, butter, &c. The constitution is a pure democracy. Pop. 34,213. The capital, Glarus, situated on the Linth amid grand scenery, is a well-built town, with a good trade. Pop. 5330.

Glas'gow, the largest city in Scotland, and probably the second largest in Britain, is situated mainly in the county of Lanark (but is now a county of itself), on both banks of the Clyde, the larger and more important part of it on the right or north bank. The southern portion is mainly built on low-lying level ground, the northern portion to a great extent on a series of elevations of varying heights. The river is crossed by ten bridges (including railway bridges), as also by ferries; and there are also tunnels under it. The streets are in general wide and straight, running mostly at right angles east and west, and north and south. Of the former the chief are Argyle Street and Sauchiehall Street, of the latter Buchanan Street. The houses are built almost wholly of freestone, and as a whole Glasgow is now excelled by few cities in the kingdom in architectural beauty and amenity of appearance. Of the buildings the Cathedral, situated in the north-east of the city, is the most noteworthy. It is supposed to have been begun about 1240, and completed within the next two centuries. It is a large Gothic edifice in the early Pointed style, with tower and spire from the centre; length of interior 319 feet; width 63 feet; height of nave 90 feet, of choir 85 feet, spire 225 feet. It is especially distinguished for the beauty of its crypt, one of the most perfect in Britain. The windows are filled with painted glass on a uniform plan. The new University buildings, in the west end of the city, cover about 4 acres of ground on a splendid site. They form an oblong rectangular pile in the Collegiate Gothic style of the 14th century, 600 feet long by 300 broad, divided into two quadrangles of 180 feet square, united by a centre building, and with a tower nearly 300 feet high. Connected with the university is the Hunterian Museum of anatomy, natural history, &c., left by Dr. William Hunter. The Municipal Buildings, in the centre of the city, in George Square, form an imposing pile in the Renaissance style, completed in 1887. Among other noteworthy buildings are various churches, the old infirmary near the cathedral, the Western Infirmary near the new university, the Victoria Infirmary in the southern suburbs, the Free Church College, Royal Exchange, Stock Exchange, County Buildings, Athenæum, Post Office, St. Enoch Station and Central Station Hotels, club-houses, banks, and insurance offices. Most of the public monuments are collected in George Square, the finest square in the city. Glasgow has several large and attractive public parks. There are also Botanic Gardens with extensive hot-houses. There is a public museum, and a collection of pictures belonging to the city, containing a number of very valuable works especially of the Venetian School. The principal libraries are the University Library, the Mitchell Free Library, the libraries of the Faculty of Medicine and of the Faculty of Procurators, and the combined Glasgow and Stirling's Libraries. St. Andrew's Halls are the finest suite of public halls. There are five theatres. The principal cemetery is the Necropolis, on a rising ground near the cathedral, and full of fine monuments. Among educational institutions after the university are Anderson's College Medical School, St. Mungo's College, the Glasgow and West of Scotland Technical College, the Free Church College, Queen Margaret College for women, the normal institutions of the Established Church and Free Church, the Glasgow School of Art, the Veterinary College, the High School, under the management of the School Board, and the Glasgow Academy. The industries are unequalled for variety by any town in the kingdom, with the exception, perhaps, of London. They embrace cotton, linen, woollen, silk, and jute, in all the processes of manufacture; calico-printing, dyeing, and bleaching; pig- and malleable iron and steel, and machinery and metal goods of all descriptions; shipbuilding, which might almost be called a staple, over 400,000 tons of shipping having been launched in some years on the Clyde; extensive chemical works, potteries, glass-works, brick-works, breweries, distilleries, tanneries, tobacco-works, sugar-refining works, &c. The commerce is commensurate in extent with the manufactures. The river

itself, the chief highway of this commerce, has been made navigable for large vessels up to the heart of the city, and the harbour accommodation is still being extended by the construction of docks, quays, &c. The value of imports in 1897 was £12,187,747, that of exports was £13,752,708.

The improvement of the navigation of the Clyde, which within the present century was fordable at and below the present harbour of Glasgow, has been of immense service to the city, though the total cost of deepening, widening, straightening, and the construction of quays, docks, &c., has exceeded £10,000,000. The railways and the Forth and Clyde and Monkland Canals form important auxiliary means of communication. Horse tramways pass along the principal streets. In a sanitary point of view Glasgow has greatly improved in recent times, but it still remains less healthy than it might be; and its atmosphere is polluted with smoke, soot, and vapours from the public works, and its river with sewage. There is, however, a great difference between the sanitary conditions of different districts. The city is excellently supplied with water from Loch Katrine, a distance of about 30 miles. The works are capable of supplying 50,000,000 gallons daily, and operations are in progress for largely increasing the supply.—The origin of the city may be traced back to the foundation of the bishopric by St. Mungo about 560. It was erected into a royal burgh in 1180. The first bridge was built in 1345. In 1546 the shipping of Glasgow is mentioned in an order of the privy-council. The General Assembly which abolished episcopacy in Scotland met in Glasgow Cathedral in 1638. In 1715 and 1745 Glasgow was conspicuously loyal to the reigning family. Up till the Union its trade was chiefly with the European Continent. The Union opened up the trade with the American colonies, and tobacco became a source of wealth to the Glasgow merchants. Latterly commerce began to take other directions, and the progress made within the present century has been very remarkable. In 1816 the first vessel was despatched to the East Indies. Previous to 1832 Glasgow joined Rutherglen, Renfrew, and Dumbarton in sending a member to parliament; it then got two members to itself, another being added in 1868; in 1885 its representatives were increased to seven. Pop. in 1610, 7644; 1712, 13,832; 1801, 77,385; population of the municipal borough in 1881, 510,816; in 1891 (boundary extended), 656,946; including contiguous suburbs, 770,000.



The Trongate, Glasgow.

Glasgow University was founded by a bull of Pope Nicholas V., 1450–51, which conferred not only the power of creating masters and doctors, but privileges and immunities identical with those of the University of Bologna. In 1577 James VI. prescribed rules for the government of the University, giving it a new charter. It has been reconstituted by the Scottish Universities Acts of 1858 and 1889, and its constitution is similar to that of the others. (See *Edinburgh University*.) The old University buildings and ground were sold to the Glasgow Union Railway Co. in 1864 for £100,000, a sum which, supplemented by University funds, government grant, public

subscriptions and donations, has enabled upwards of £600,000 to be expended on fine new buildings in the west end of Glasgow. The University comprises five faculties, viz., arts, science, divinity, law, and medicine, each of which embraces a suitable equipment of chairs and professors, the latter numbering 29 in all, besides a number of lecturers. With it is incorporated Queen Margaret College for women. The exhibitions, scholarships, bursaries, &c., from funds administered by the University, have an annual value of about £8000. The most valuable are the George A. Clark scholarships, four in number, tenable for four years, and each about £180 in annual value. The examinations for these are respectively in classics, mental philosophy, mathematics, and natural science. The Snell Exhibitions, each about £80 in annual value, tenable for five years, are intended to assist students studying at Oxford University (Balliol College). There are also a Black Theological Fellowship, value £140; the Luke Fellowship, value £120; the Metcalfe Fellowship, value £100; and two Eglinton Fellowships, value £100 each. The degrees conferred are almost the same as at Edinburgh. There were 1695 matriculated students in 1894–95, besides 208 women. Along with the University of Aberdeen Glasgow University returns a member to parliament. The University library numbers about 175,000 volumes.

Glass, an artificial substance, hard, brittle, and in its finest qualities quite transparent, formed by the fusion of silicious matters with an alkali. Of the origin of its manufacture nothing is known, but the ancient Egyptians carried the art to great perfection, and are known to have practised it as early as 2000 B.C., if not earlier. The Assyrians, the Phœnicians, the Greeks and Etruscans were all acquainted with the manufacture. The Romans attained peculiar excellence in glass-making, and among them it was applied to a great variety of purposes. Among the most beautiful specimens of their art are the vases adorned with engraved figures in relief; they were sometimes transparent, sometimes of different colours on a dark ground, and very delicately executed. The Portland or Barberini vase is almost the only surviving specimen of this kind. The mode of preparing glass was known long before it was thought of making windows of it. The first mention of this mode of using glass is to be found in Lactantius, in the 3d century after Christ. St. Jerome also speaks of it being so used (422 A.D.). Benedict Biscop introduced glass windows into Britain in A.D. 674. In church windows it was used from the 3d century. The Venetians were long celebrated for their glass manufacture, which was established before 700 A.D. Britain did not become distinguished for glass until about the commencement of the 16th century. The excise laws relative to the glass manufacture were at one time complicated in the extreme, and tended to check improvements in glass-making. These laws were repealed in 1845 by Sir Robert Peel, as part of his free-trade policy, and beneficial effects were immediately apparent in the improved quality, cheapness, and greater variety of descriptions of glass produced. Britain both exports and imports glass, the value of the imports being usually above that of exports. Glass is largely made in France, Germany, Belgium, and the U. States. For coloured glass Bohemia has long had a high reputation.

Glass is formed by the fusion of silicious matter, such as powdered flint or fine sand, together with some alkali, alkaline earth, salt, or metallic oxide. The nature of the glass will depend upon the quality and proportion of the ingredients of which it is formed; and thus an infinite variety of kinds of glass may be made, but in commerce five kinds are usually recognized: 1. Bottle or coarse green glass. 2. Broad, spread, or sheet window-glass. 3. Crown-glass, or the best window-glass. 4. Plate-glass, or glass of pure soda. 5. Flint-glass, or glass of lead. Coloured glass may be mentioned as a sixth kind. The physical properties of glass are of the highest importance. Perhaps the chief of these is its transparency, and next to that its resistance to acids (except hydrofluoric). It preserves its transparency in a considerable heat, and its expansibility is less than that of any other known solid. Its great ductility, when heated, is also a remarkable property. It can, in this state, be drawn into all shapes, and even be spun into the finest threads. It is a bad conductor of heat, and is very brittle. It is usually cut by the diamond.

The works in which glass is made are called *glass-houses*. They are commonly constructed of brick, and made of conical form. A large vault is made in the interior of the cone, extending from side to side, and of sufficient height to allow workmen

to wheel in and out rubbish from beneath the furnace, which is placed over the vault, and separated from it by an iron grating. The materials used for the formation of the glass are sometimes calcined in a *calcar* or *fritting furnace*, and a chemical union between the ingredients commenced, forming a *frit*. But this process is not essential, and the materials, after being ground and thoroughly mixed up together, are now usually placed at once in *melting pots* or crucibles made of Stourbridge fire-clay, or other similar material, the melting-pots being then placed in the melting furnace or oven. This is a kind of reverberatory furnace, is often circular in form, arched or domed above, and capable of keeping up an intense heat. The crucibles are placed in the furnace at equal distances from each other round the circumference, each pot being opposite to an opening in the wall of the furnace in order that the crucible may be charged or discharged by the workman from without. In recent times a furnace called a *tank* furnace has come into use and enables melting pots to be dispensed with, as the material can be melted in and worked from the furnace directly. The use of the *annealing furnace*, is also essential in glass-making, the process of allowing the glass to cool there being called *annealing*. Unless this process be carefully managed, the articles formed in the glass-house can be of no use, from their liability to break by the slightest scratch or change of temperature.

Sheet glass is the commonest description of glass. It is composed of various ingredients in varying proportions, usually of sand, chalk, or limestone, sulphate of soda, and cullet or broken glass. A coarse variety of it may be made of a mixture of two parts by measure of soap-boilers' waste, one of soda-ash and one of cleaned sand. In France the materials employed are commonly:—sand 100 parts, sulphate of soda 30, carbonate of lime 30, coke to aid in the reduction of the sulphate of soda 5, with some bioxide of manganese to correct the greenish tinge that glass with a soda base possesses. When the materials are properly melted a quantity is taken out of the pot on the end of an iron tube about 5 ft. long, and the workman by blowing into and swinging the tube while heating and reheating the glass, imparts a cylindrical shape to the newly-formed product. The rounded extremity of the cylinder (which may be 4 ft. long or more) is softened in the furnace in order to enable the workman to blow a hole in it. This opening may be made by heating the cylinder and then stopping up the tube with the thumb, when the expansion of the air causes the cylinder to burst open at the end. The other rounded end is detached after cooling by winding round its circumference a thread of red hot glass, which causes a clear fracture. The cylinder is now split open parallel to its axis by a diamond, and then conveyed to the *flattening furnace* where it is heated and opened out into a flat sheet of glass. It is afterwards placed in the annealing furnace.

Crown glass is differently formed by different makers, but its composition is essentially the same as the best sheet glass. It used to be the only window-glass made in Britain, but its manufacture has been almost or altogether superseded by that of sheet glass. The ingredients being melted and at the proper temperature, a quantity of the glass is withdrawn by the tube (to the amount, by successive addition, usually of 10 lbs. in all). By various manipulations this from having the form of a hollow oblate spheroid is made to assume the form of a thin circular plate, with a thick part called the *bull's eye* in the centre, being the point at which an iron rod was attached to it for the purpose of causing it to revolve rapidly and spread out into a sheet before the furnace. The bull's eye used to be commonly seen in the windows of humble dwellings, the pieces of glass containing them being cheap.

Flint-glass or Crystal is one of the kinds largely made, being employed especially for table utensils, globes, ornaments, &c. Powdered flint was formerly employed in its manufacture, but fine white sand has been substituted. The other materials are red-lead or litharge, and pearl-ash (carbonate of potash). The following is said to be a good mixture :—Fine white sand, 300 parts; red-lead or litharge, 200; refined pearl-ash, 86; nitre, 20; with a small quantity of arsenic and manganese. The furnace is kept at a very high temperature until the whole of the materials are fused. When the glass becomes translucent the temperature is diminished until it becomes a tenacious mass. Suppose a glass vessel is to be made, the iron tube is put into the crucible, and the required quantity of glass lifted out, which after certain adjustments is rolled into a cylindrical form on an iron table called the *merver* or *marver*. The workman

then blows the glass into the form of a hollow globe, and re-heats and blows until the globe becomes of the required thinness. An iron rod called the *punty* is now attached to the end of the glass furthest from the tube, and the tube detached. The workman now heats the glass on the punty, and sitting down upon a chair with smooth arms, he lays the punty upon them, and rolling it with his left hand he gives the glass a rotatory motion, while with an instrument in his right, somewhat like a pair of sugar-tongs, he enlarges or contracts the different parts of the vessel until it assumes the requisite shape. A pair of shears is also made use of in certain cases. The article is then detached from the punty, and carried to the annealing furnace. Many of the articles, after coming from the annealing furnace, are sent to the cutter or grinder. The operation of grinding is performed by wheels of various diameter and of various edges, some of iron, others of stone, and some of wood. Rich and delicate designs may be cut upon the articles by means of small wheels of copper and steel upon which emery is kept constantly falling. Ornamental figures may also be engraved, or rather etched, upon articles of glass by means of hydrofluoric acid, care being taken to place a coating of some substance over the parts not to be acted upon. Various ornamental forms are given to the surface of glass vessels by metallic moulds. The mould is usually of copper, with the figure cut on its inside, and opens with hinges to permit the glass to be taken out. The angles of moulded objects are always less sharp than those of cut-glass.

Green or *bottle-glass* is formed of the coarsest materials, such as coarse sea or river sand, lime, and clay, and the most inferior alkalies, as soap-boilers' waste, and the slag of iron ore. A cheap mixture for this kind of glass may be made of common sand and lime, with a little clay and sea salt. The manipulations of the glass-blower in fashioning bottle-glass into various forms are in general the same as those performed by the flint-glass blower. Wine and beer bottles, which are required to be all of a certain capacity, are blown in moulds, so that their containing portion may be as nearly as possible of the requisite size. When the articles are made they are carried to the annealing furnace. Green bottle-glass is preferable to all other kinds for vessels required to contain corrosive substances; it is less fusible than flint glass, and thus is better calculated for many chemical purposes.

Plate-glass is a fine and thick glass cast in sheets. One maker's ingredients are as follows:—white sand, 300 lbs.; soda, 200; lime, 30; oxide of manganese, 2; oxide of cobalt, 3 oz.; and fragments of glass (cullet) equal to the weight of sand. After being melted in large crucibles, and the liquid glass having been thoroughly skimmed, it is transferred by a copper ladle to smaller pots (*cuvettes*). When the glass in the smaller crucible is ready for casting it is poured upon an iron *casting-table*, and a large metal cylinder moved along spreads the glass into a broad uniform sheet. The subsequent stages of the process are concerned with the discovery of flaws, the squaring of the edges, the grinding of the surfaces plane, the grinding of the sides, and the polishing. Before grinding and polishing the glass is what is called common 'rough plate,' and in this state it is much used for roofing, cellar-lighting, &c., being non-transparent. 'Rolled plate,' which is cast on a table that imparts a surface of grooves, flutings, lines, &c., is extensively used for the same purposes.

There are several other kinds of glass that may be noticed. *Pressed glass* is flint-glass formed into articles by pressing into moulds of iron or bronze, a fine surface being afterwards attained by heating so that a thin film on the surface melts. *Slag glass* is glass from the slag of blast-furnaces mixed with other ingredients; it is largely used for bottles. *Optical glass* is made of special varieties of flint and crown glass. *Strass*, which is used for imitating gems, is a very dense flint-glass, colours being imparted by metallic oxides. *Spun glass* is glass in the form of very fine threads, in which state it may be woven into textile fabrics of great beauty. *Toughened* or *hardened glass*, having certain properties owing to its being heated to the melting point and plunged into an oleaginous mixture, was introduced some time ago, but has not answered the expectations formed of it.

Coloured Glass.—Coloured glass is of two kinds—entirely coloured, the colouring matter being melted along with the other ingredients; or partially coloured, a quantity of white glass being gathered from one pot, and dipped into the other containing the coloured glass, by which the whole receives a skin of coloured glass. The colouring matters are chiefly the metallic oxides. A beautiful yellow colour is imparted by silver

in union with alumina (powdered clay and chloride of silver being used), also by uranium and by glass of antimony; red colours by oxide of iron, copper, and gold; green by protoxide of iron, oxide of copper, oxide of chromium, &c.; blue by cobalt; orange by peroxide of iron with chloride of silver. Bohemia is particularly famous for its manufactures of articles in coloured glass.

Glassites, a religious body founded in Scotland in the last century by John Glass, a minister of the Established Church. They maintain certain practices, such as weekly communions, love-feasts, washing each other's feet, and mutual exhortations. They disapprove of all games of chance, and of all use of the lot except for sacred purposes.

Glass-painting, the art of producing pictures upon glass with colours that are burned in, or by the use of pieces of coloured glass, in which the colour forms part of the composition of the glass itself. Originally there was but one method of making ornamental glass windows, which was by the latter process: the pieces of stained or coloured glass were cut to the desired shape, and let into the grooves of finely-made leaden frames which formed the pattern in outline, so that the pictures resembled mosaic work. In the sixteenth century, the *enamel* colours having been discovered, a new process came into vogue, the designs being now painted on the glass and burned in. At the present day the two methods, or a combination of the two, are chiefly employed, the *mosaic-enamel* method being the most common, and consisting of a combination of these two. The chief seats of the art in Britain are Birmingham and Edinburgh; in France, Paris and Sèvres; and in Germany, Munich and Nürnberg.

Glass Paper, or CLOTH, is made by strewing finely pounded glass on a sheet of paper or cloth which has been besmeared with a coat of thin glue, the glue being still wet. It is much used for polishing metal and wood-work.

Glass Snake, a lizard, genus *Ophiosaurus*, in form resembling a serpent, and reaching a length of 3 feet. The joints of the tail are not connected by caudal muscles, hence it is extremely brittle, and one or more of the joints break off when the animal is even slightly irritated.

Glass-sponges. See *Sponges*.

Glass'wort, a name given to the plants of the genus *Salicornia*, nat. order Chenopodiaceæ, succulent marine herbs growing abundantly on the coasts in the south of Europe and north of Africa, and yielding by burning ashes containing soda, formerly much employed in making both soap and glass. Two or three species are natives of Britain.

Glastonbury, a town of England, county of Somerset, which derives interest from the ruins of its once magnificent Benedictine abbey, now consisting of some fragments of the church, the chapel of St. Joseph of Arimathea, and what is called the abbot's kitchen. Its abbots sat among the barons in Parliament. The last was hanged on a neighbouring eminence by order of Henry VIII. for refusing to surrender the abbey. Pop. 4119.

Glatz, a town of Prussia, province of Silesia, on the Neisse, 51 miles S.S.W. of Breslau; manufactures of linen, cotton, and woollen goods, leather, carpets, &c. It has a fortress or citadel, now of little importance. Pop. 13,588.

Glauber, JOHN RUDOLPH, a German chemist, born in 1603 or 1604. His life seems to have been somewhat unsettled—at least he resided in many different places—Vienna, Saltzburg, Frankfort, Kitzingen, Cologne, and Basel, and finally in Amsterdam, where he died in 1668. He is chiefly remembered for his discovery of sulphate of soda or *Glauber's Salt*, which he termed *sal mirabile*, in consequence of his great faith in its medicinal qualities.

Glauber's Salt, sulphate of sodium, so called because of the importance attached to its chemical and medicinal properties by Glauber. It forms large colourless monoclinic prisms, which effloresce on exposure to the air. It is soluble in water, and when heated melts in its water of crystallization. It is found in many localities, both dissolved in the water of mineral-springs and of salt lakes, round which it effloresces.

Glauchau (glou'*h*ou), a manufacturing town of Saxony, on the Mulde, 54 miles W.S.W. of Dresden. It has manufactures of woollens, carpets, linens, leather, dye-works, print-fields, and worsted mills. Pop. 21,715.

Glauco'ma, in med. an almost incurable disease of the eye, in which the eyeball becomes of stony hardness by the accumulation of fluid within, and the consequent increase of pressure causes disorganization of all the tissues. Loss of sight is sometimes very rapid. Called also *Glaucosis*.

Glazing, is the covering of earthenware vessels with a vitreous coating in order to prevent their being penetrated by fluids.

The materials of common glass would afford the most perfect glazing were it not that a glazing of this sort is liable to cracks when exposed to changes of temperature. A mixture of equal parts of oxide of lead and ground flint is found to be a durable glaze for the common cream-coloured ware, and is generally used for that purpose. See *Pottery*.

Gleaning, the gathering by poor people of the loose ears of corn left uncared for by reapers. This is a common practice in England, and it used to be believed that the poor could legally claim to be allowed to do so; but it has been decided otherwise at law.

Glebe, in the established churches of England and Scotland, the land possessed as part of the revenue of an ecclesiastical benefice, usually along with a dwelling-house. The incumbent may be regarded as the proprietor of the glebe for the time being, but he cannot alienate it. In Scotland, where lands are arable, the glebe must consist of 4 acres at least. The glebe must be taken as near the manse as possible.

Gleditsch′ia, a genus of plants, order Leguminosæ, to which *G. triacanthos*, the honey-locust, belongs.

Glee, in music, a composition in three or more parts, generally consisting of more than one movement, the subject of which may vary greatly, from grave to gay, &c. Instrumental accompaniment is illegitimate.

Gleemen, itinerant singers in the Anglo-Saxon period of English history. After the Norman conquest they were termed *minstrels*.

Gleiwitz (glī′vits), a town, Prussia, province of Silesia, on the Klodnitz. It has an extensive government iron-work, foundries, machine-works, glass-works, worsted and other mills, &c. Pop. 17,660.

Glencoe (glen-kō′), a romantic Scottish valley in the county of Argyle, near the head of Loch Etive. It is bounded on both sides by almost perpendicular mountains over 3000 feet high, and is traversed by a mountain stream, Ossian's 'dark torrent of Cona.' The valley was the scene of a tragedy known as the Massacre of Glencoe. The state of the Highlands after 1690 was a subject of great anxiety to the government. Although the Highlanders had ceased any important operations since the death of Dundee at Killiecrankie, they had not laid down their arms. In 1691 a proclamation was issued promising pardon to all who should swear allegiance on or before 31st December, 1691. All the chiefs, with the exception of one Ian of Glencoe, complied. The latter had unfortunately exceeded the prescribed period, and a certificate which he produced to prove that he had offered to take the oaths at Fort-William was suppressed, as is thought, by Stair. The king's signature was obtained to an order to extirpate the MacDonalds. On the 1st of February a party of soldiers, 120 in number, commanded by Captain Campbell of Glenlyon, marched up the glen and took quarters as friends. The soldiers belonged mostly to the clan Campbell, enemies of the MacDonalds; but they were well treated, and all went merrily on for twelve days. At five in the morning of the 13th Glenlyon and his men suddenly fell on the MacDonalds. Thirty-eight men were murdered, but many who had escaped perished in the snow, sank into bogs, or died for lack of food. Much obloquy has been heaped upon King William on account of his share in the massacre, but the utmost of what he would seem to have been guilty was carelessness in signing without investigation the order mentioned above.

Glendower, Owen, a distinguished figure in Welsh history, born about 1350. At an early age he was sent to London, and studied for the bar, but relinquished the profession on being appointed an esquire to Richard II., whom he supported to the last. He carried on a contest with Lord Grey de Ruthyn respecting an estate, and the latter being charged with the delivery of a summons to Owen from Henry, to attend him on his Scottish expedition, purposely neglected to deliver it. Glendower was outlawed for disaffection, and his enemy seized upon his lands. Glendower dispossessed Grey of his lands, and, having raised a considerable force, caused himself to be proclaimed Prince of Wales, Sept. 20, 1400. He defeated the king's troops, and retiring to the mountains foiled all subsequent attempts to bring him to action. He afterwards joined the coalition of the Percys, against Henry, and was crowned 'sovereign of Wales.' Glendower arrived with his force too late for the battle of Shrewsbury; and, seeing all was lost, retreated, and continued his marauding warfare. This he kept up with various success, occasionally assisted by Charles VI. of France. Finding it impossible to subdue him, Henry V., in 1415, condescended to treat with him; but Owen died during the negotiation.

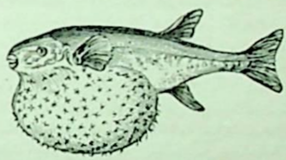
Glenliv'et, a valley or district of Scotland in the county of Banff. Whisky of a particularly fine flavour has long been made in the district. In Glenlivet the Protestant army, under the Earl of Argyle, was defeated by a Roman Catholic force under the Earl of Huntly in 1594.

Glenroy', a deep valley in the Highlands of Scotland, parallel to Glenmore (the Great Glen), in Lochaber, Inverness-shire. It is nearly 14 miles in length, and little more than ½ mile in breadth, and is celebrated for its so-called *Parallel Roads*, which are three parallel terraces running along either side of the glen. Not only do the lines on the same side run parallel to each other, but on both sides they respectively occupy the same horizontal level. These terraces project, at some parts only a few feet from the hill-side, and at others widen out so as to be a number of yards in breadth. The lowest terrace is 850 to 862 feet above the sea-level; the middle, 1062 to 1077 feet; and the highest 1144 to 1155 feet. Their origin has been much disputed, but according to Macculloch, Agassiz, Buckland, and Geikie, the roads are shore-lines of fresh-water lakes. As, however, no land-barrier is discoverable in the vicinity, they refer the lake or lakes to the glacial period, holding that glaciers must have descended from Ben Nevis and dammed up the water in Glenroy. As these glaciers did not disappear simultaneously, the surface of the lake had different elevations successively, and thus distinct shore-lines or beaches were formed at different times.

Glentilt', a mountain valley in Scotland, Perthshire, traversed by the Tilt, having its southern extremity at Blair Castle, and there opening into the valley of the Garry. Marble of a pure white, of a light gray, and of a beautiful green, has been quarried in its recesses.

Globe, a sphere, a round solid body, which may be conceived to be generated by the revolution of a semicircle about its diameter. An artificial globe, in geography and astronomy, is a globe of metal, plaster, paper, pasteboard, &c., on the surface of which is drawn a map, or representation of either the earth or the heavens, with the several circles which are conceived upon them, the former being called the *terrestrial globe*, and the latter the *celestial globe*. In the terrestrial globe the wire on which it turns represents the earth's axis, the extremities of it representing the poles. The *brazen meridian* is a vertical circle in which the artificial globe turns, divided into 360 degrees, each degree being divided into minutes and seconds. The brass meridian receives the ends of the axis on which the globe revolves. At right angles to this, and consequently horizontal, is a broad ring of wood or brass representing the horizon; that is, the true horizon of the earth, which lies in a plane containing the earth's centre. The horizon and brass meridian are connected with the stand on which the whole is supported. On the surface of the globe, as on other maps, are marked parallels of latitude, meridians, &c. On a globe of some size the meridians are drawn through every 15° of the equator, each answering to an hour's difference of time between two places. Hence they are called the *hour circles*. A number of *problems* or questions, many of them more curious than useful, may be solved by means of a terrestrial globe. Among the most important are such as to find the latitude and longitude of a place, the difference of time between two places, the time of the sun's rising and setting for a given day at a given place, &c.

Globe-fish, the name given to several fishes of the genera *Diŏdon* and *Tetraŏdon*,



Pennant's Globe-fish (*Tetraodon lævigātus*).

order Plectognathi, remarkable for possessing the power of suddenly assuming a globular form by swallowing air or water, which, passing into a ventral sac, inflates the whole animal like a balloon.

Globe-flower, a popular name of *Trollius europæus* (nat. order Ranunculaceæ), a common European plant in mountainous regions, having deeply five-lobed serrated leaves and round pale-yellow blossoms, the sepals of which are large and conspicuous, while the petals are very small. It is often cultivated in gardens, and is common in mountain pastures in the north of England, north of Ireland, Wales, and Scotland.

Globigeri'na, one of the Foraminifera, a microscopic animal having a many-celled shell found fossil in the chalk and tertiary formations, and still so abundant in our

seas that its shells after death form vast calcareous deposits of mud or ooze known as 'globigerina ooze.'

Glob'ulin, a substance forming a considerable proportion of the blood globules, and also occurring, mixed with albumen, in the cells of the crystalline lens of the eye. It resembles albumen.

Glockner, or GROSS GLOCKNER, a mountain in Austria belonging to the Noric Alps, on the frontiers of the Tyrol, Carinthia, and Salzburg. It is 12,350 feet in height, and takes its name from the resemblance of the principal summit to a large bell.

Glogau, or GROSS-GLOGAU, a Prussian town and fortress in Silesia, on the Oder, 54 miles N.W. of Breslau. It has a Lutheran and a Catholic gymnasium, some manufactories and a brisk inland trade. Its principal edifices are four churches, one of them formerly a cathedral. Pop. 20,027.

Glommen, the largest river in Norway, issues from Lake Oresund, about 2417 feet above the sea-level, in the south-east of South Trondhjem, flows generally S., and after a course of above 370 miles falls into the Skagerrack at Frederikstadt.

Gloria in Excelsis Deo, 'glory to God in the highest,' the initial words (sung by the angels when the birth of Christ was announced to the shepherds) of a short Latin hymn known as the greater doxology, and used in the service of many Christian churches.

Gloria Patri, 'glory be to the Father,' the initial words of a short formula or hymn of praise to the Trinity known as the lesser doxology.

Glorio'sa, a genus of tuberous-rooted climbing herbs of the nat. order Liliaceæ, so named from the splendid appearance of its flowers. They have branched stems and flowers mostly of a beautiful red and yellow colour, with six long lanceolate undulated segments, which are entirely reflexed. *G. superba*, a native of India and tropical Africa, is cultivated in hothouses.

Glory Pea, a name given to *Clianthus Dampieri*, a leguminous plant, native of the desert regions of Australia, a low straggling shrub with light-coloured, hairy, pinnate leaves, and large, brilliant scarlet flowers, the standard or banner petal of which appears in the form of an elongated shield with a dark brown boss in the centre.

Gloss, an explanation of some verbal difficulty in a literary work, written at the passage to which it refers. The earliest glosses as those in Greek, Latin, and Hebrew MSS. were interlinear; they were afterwards placed in the margin, and extended finally in some instances to a sort of running commentary on an entire book.

Glos'sary, a limited or partial dictionary, a vocabulary of words used by any author, especially in an old author, or one writing in a provincial dialect, or of words occurring in a special class of works, of the technical terms of any art or science, of a dialect, and the like.

Glossic, a phonetic system of spelling invented by Mr. A. J. Ellis, intended to be used concurrently with the existing English orthography (Nomic) in order to remedy some of its defects without changing its form or detracting from its value. The following is a specimen of Glossic:—Ingglish Glosik konvai·z whotev·er proanunsiai·shon iz inten·ded bei dhi reiter. Glosik buoks kan dhairfoar bee maid too impaar·t risee·vd aurthoa·ipi too aul reederz.

Glossop, a municipal borough of England, in Derbyshire, 30 miles from Sheffield. It is the principal seat of the Derbyshire cotton manufacture, and there are also woollen and paper mills, iron foundries, dyeing, bleaching and print works, &c. Pop. 22,414.

Glottis, the opening at the upper part of the trachea or windpipe, and between the vocal chords, which, by its dilatation and contraction, contributes to the modulation of the voice. See *Larynx*.

Gloucester (glŏs'tėr), a city, county of itself, parliamentary borough, and river port, England, capital of the county of same name, on the left bank of the Severn, here divided into two channels inclosing the Isle of Alney and crossed by two fine bridges, 33 miles north by east of Bristol, and 95 miles west by north of London. It carries on a considerable shipping trade, the Gloucester and Berkeley canal giving access to the docks. The most remarkable public edifice is the cathedral; it was originally the church of a Benedictine abbey, dating from 1058, and was converted into a cathedral at the Reformation. It is cruciform, 444 feet in length, 154 in breadth, and 85½ in height, with a tower 230 feet high. It exhibits a great variety of styles, the choir, with its roof of fan-tracery being a fine example of Perpendicular Gothic. Other buildings are several handsome old churches, the shire hall, the guildhall, the bishop's palace, county schools of art and science, &c. The schools include the collegiate school founded by Henry VIII.,

the theological college, the blue-coat school founded in 1666 (and now known as Sir Thomas Rich's school), and the grammar-school of St. Mary de Crypt, founded in the time of Henry VIII. The industries are rather varied. Gloucester, which formerly returned two, now sends one member to parliament. Pop. 39,444.—The county is bounded by the Severn, Monmouth, Hereford, Worcester, Warwick, Oxford, Berks, Wilts, and Somerset; area, 804,977 acres, of which five-sixths are under crops and pasture. The county is naturally divided into three distinct districts, the Hill or Cotswold in the E.; the Severn valley in the middle; and the Forest of Dean in the W. The principal rivers are the Severn, with its affluents the Wye, the Leden, and Lower and Upper Avon; and the Isis or Thames, with its affluents the Colne, Churnet, and Windrush. Iron and coal are found in the Forest of Dean, and the collieries employ a large number of hands. Coal is also found and extensively worked in the south part of the county; and lead ore is found in various parts. Limestone and free-stone are also met with. Agriculture is in a flourishing state, especially in the vale districts of the county. Gloucester is, however, much more of a dairy than an agricultural county. The celebrated cheese, known as double and single Gloucester, is produced chiefly in the Vale of Berkeley. Orchards are numerous, from the produce of which large quantities of cider are made. Gloucester is a considerable manufacturing county, and has been long famous for its fine broad-cloths. For parliamentary purposes the county is divided into five divisions, one member to each. Pop. 599,974.

Gloucester, a town and port of Essex county, Massachusetts, near the extremity of Cape Ann, 28 miles N.N.E. of Boston. It is a popular summer resort; and fisheries and granite quarrying are the chief industries. About two miles distant is Norman's Woe, the scene of the wreck of the 'Hesperus' celebrated by Longfellow. Pop. 24,651.

Gloucester, ROBERT OF, a monk of the abbey of Gloucester, flourished in the latter half of the 13th century; wrote a chronicle of England extending from the siege of Troy to the year 1270. It is largely based on Geoffrey of Monmouth, with a few original notices. He is also said to have written metrical Lives of the Saints.

Glover, RICHARD, an English poet, born 1712; died 1785. Though engaged in mercantile pursuits he devoted much of his attention to literature, and acquired a high reputation as a scholar and a poet. In 1760 he entered parliament, where his abilities gained him considerable influence. He was the author of two epics, Leonidas and the Atheniad; London, or the Progress of Commerce; two tragedies, Boadicea and Medea, &c.

Gloversville, a town, Fulton co., New York, 44 miles N.W. of Albany. Glove-making is the principal business, hence the name of the place. Pop. 13,864.

Gloves, are coverings for the hand, or for the hand and wrist, with a separate sheath for each finger. They are made of leather, fur, cloth, silk, linen thread, cotton, worsted, &c. The chief leathers used in glove manufacture are doe, buck, and calf-skins; sheep-skin for military gloves; lamb-skin for much of the so-called kid gloves; true kid for the best and finest gloves; dog, rat, and kangaroo skins, &c. The leather in all cases undergoes a much lighter dressing than when used for boots and shoes. Leather gloves are usually cut out by means of dies, and sewed by a machine of peculiar construction. The best woollen, thread, and silk gloves are made by cutting and sewing, but commoner gloves are made by knitting and weaving. In England leather gloves are manufactured at London, Worcester, and elsewhere. Limerick was formerly celebrated for gloves of a peculiarly delicate kind. Gloversville, in New York, is the chief American seat of the manufacture. Italy, Belgium, Sweden, Denmark, and Germany all manufacture excellent gloves, but France supplies the world with most of the finer and more expensive kinds. Large quantities of cotton gloves are manufactured at Nottingham and Leicester; and the greater part of the woollen gloves is made in Wales, Scotland, and the North of England. Gloves are a very ancient article of dress, and many curious customs and usages are connected with them. Throwing the glove down before a person amounted to a challenge to single combat. The judges in England used to be prohibited wearing gloves on the bench; and it was only in case of a maiden assize that the sheriffs were allowed to present a judge with a pair of gloves.

Glow-worm, an insect of the genus *Lampȳris* (*L. noctilūca*), of the order Coleoptera, or beetles, the name being strictly applicable only to the female, which is without wings, somewhat resembles a caterpillar, and emits a shining green light from the extremity of

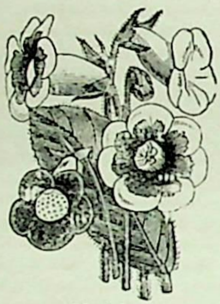
the abdomen. The male is winged, and flies about in the evening, when it is attracted by the light of the female, but gives out no light itself. It would seem that the glow-worm possesses the power of moderating or increasing the light at will. Decapitated specimens retain their power of giving out light for a considerable time. In pure oxygen, warm water, or when crushed, the light of the luminous organs is increased in intensity. The larvæ are very voracious, living on snails, which they attack and kill.



Glow-worm (*Lampyris noctilūca*).

1, Male. 2, Female, upper side. 3, Female, under side, showing the three posterior segments (*a*) from which the light proceeds.

Gloxin'ia, a genus of plants, nat. order Gesneraceæ, distinguished by the corolla approaching to bell-shaped, the upper lip shortest and two-lobed, the lower three-lobed, with the middle lobe largest, and also by the summit of the style being rounded and hollowed. The species are natives of tropical America, whence they were introduced into Britain early last century. They are now among the greatest ornaments of European hothouses, owing to their richly coloured leaves and their ample, graceful, delicately tinted flowers.


Gloxinias.

Gluchov, or GLOUKHOV (glö'*h*ov), a town of Russia, government of, and 148 miles east by north from Tchernigov. Pop. 16,440.

Glucic (or GLUCINIC) **Acid** ($C_{12}H_{18}O_9$), an acid produced by the action of alkalies or acids on sugar. It is a colourless, amorphous substance, is very soluble in water, attracts rapidly the moisture of the air, and its solution has a decidedly sour taste. All its neutral salts are soluble.

Gluci'na, the only oxide of the metal glucinum or beryllium. It is white, tasteless, without odour, and quite insoluble in water, but soluble in the liquid fixed alkalies.

Gluci'num. Same as *Beryllium*.

Gluck (glụk), CHRISTOPH WILIBALD, RITTER VON, German musical composer, born in Bavaria in 1714; died at Vienna 1787. When a boy he became a chorister, and acquired some skill on the harpsichord and organ. At eighteen years of age he went to Prague to enter the university, where he maintained himself by the exercise of his musical gifts. By degrees he attracted the attention of several Bohemian nobles, and Prince Lobkowitz assisted him when he went to Vienna to pursue his musical studies. The Lombardian prince di Melzi then took him to Milan, where he studied under Giovanni Battista Sammartini, a famous organist and composer. In 1740 he was employed to compose an opera for the court theatre of Milan. The text chosen for him was the Artaxerxes of Metastasio, and the opera was a triumph, in spite of the innovations of style which the author introduced. In 1742 he wrote Demofoonte for Milan; Demetrio and Ipermnestra for Venice; in 1743 Artamene for Cremona, and Siface for Milan; in 1744 Fedra for the same theatre; and in 1745 Allessandro nell' Indie for Turin, all founded on classical subjects. Invited to London, he produced La Caduta de Giganti (Fall of the Giants), which was not a success. In London Gluck became deeply impressed with the majestic character of Handel's airs and choruses, and with the simple but natural dramatic style of Dr. Arne. This visit to London, and a short trip to Paris, helped to develop that lyric genius which was destined to create a new order of musical composition. After producing many pieces of the usual class of opera at Paris, Vienna, Rome, and Naples, he returned to Vienna. The Trionfo di Clelia (1762) was the last of his operas in his first style. However well pleased the public was with his music, he was not so. He felt himself continually cramped by the character of the libretti of Metastasio, who had hitherto furnished him with texts, which were rather lyrical dramatic poems than genuine dramas. The composer at last found a poet in the person of Raniero Calzabigi, who sympathized with him in his ideas, and the result of their co-operation was the Orfeo ed Euridice, performed publicly for the first time in 1762. This opera

marked a new era. The fame it acquired at once it never lost. Various works of lighter character filled up the interval between this year and 1766, when his second great opera of Alceste was produced, which raised public feeling to the point of enthusiasm. In his dedication of this work to the Grand-duke Leopold of Tuscany he enunciates the principles of the new school, which shortly were that the opera should be a musical drama, not a concert in costume; that the text must be descriptive of real passion; that the music must voice fully the spirit of the text; that in accompaniments the instruments must be used to strengthen the expression of the vocal parts by their peculiar characters, or to heighten the general dramatic effect by employing them in contrast to the voice. Gluck now became convinced that his system must be tested on a wider field, and believed that the Royal Opera in Paris offered all a composer could demand. A Frenchman of culture and genius, Bailly du Rollet, adapted Racine's Iphigénie en Aulide for musical treatment, and after a considerable amount of opposition from the musical critics of the old Italian and French school, at that time represented in Paris by Piccini, the piece was brought out in 1774. The intensest excitement prevailed; all Paris took sides, and for a long time the Gluckists and Piccinists contended with much bitterness, but ultimately the victory remained with the Gluckists. Shortly after the production of the Iphigénie, the Orfeo was adapted for and put on the French stage, and was followed by the Armide in 1777, by the Iphigénie en Tauride in 1779, Gluck's last important work, and by many considered his greatest. It ends the series of works which gave a direction to the operatic genius of Méhul and Cherubini in France, and of Mozart and Beethoven in Germany.

Glückstadt (glük'stät), a town of Prussia, in Holstein, on the Elbe, 28 miles N.W. Hamburg. Formerly important as a fortress, it is now a sort of sub-port to Hamburg. Fishing is carried on to a considerable extent. Pop. 5483.

Glu'cose ($C_6H_{12}O_6$), a variety of sugar, less sweet than cane-sugar, existing in grapes, and produced from cane-sugar, starch, dextrin, cellulose, &c., by the action of acids, certain ferments, and other reagents. There are two varieties of it, distinguished by their action on polarized light, viz. *dextro-glucose* which turns the plane of polarization to the right; and *lævo-glucose*, which turns it to the left. When heated up to 400° it becomes caramel, and is used by cooks and confectioners as a colouring matter. It is called also *Grape-sugar* and *Starch-sugar*, and is produced both in the solid and in the liquid form, its manufacture being now of considerable importance. In the United States the liquid sugar, as prepared from Indian corn starch, is what is generally known as glucose, and it is used for various purposes, as for confectionery, canning fruits, making artificial honey, for table syrup, in brewing, &c.

Glu'cosides, a large class of substances occurring in animal or vegetable products, possessing the common property of yielding glucose and other products when they are boiled with dilute acids, or are acted on by certain ferments.

Glue, a gelatinous substance obtained from different tissues of animals, and used as a cement for uniting pieces of wood or other material. The best quality is obtained from fresh bones, freed from fat by previous boiling, the clippings and parings of ox-hides, the older skins being preferred; but large quantities are also got from the skins of sheep, calves, cows, hares, dogs, cats, &c., from the refuse of tanneries and tawing works, from old gloves, from sinews, tendons, and other offal of animal origin. By a process of cleaning and boiling the albuminoid elements of the animal matter are changed into gelatine. This in a soft jelly-like state constitutes *size;* dried into hard, brittle, glassy cakes, which before use must be melted in hot water, it forms the well-known glue of the joiner, &c. When a solution is mixed with acetic or nitric acid it remains liquid, but still retains its power of cementing; in this state it is called *liquid glue*. *Marine Glue* is a cement made by dissolving india-rubber in oil of turpentine or coal-naphtha, to which an equal quantity of shellac is added.

Glume, in bot. the imbricate scale-like bract inserted on the axis of the spikelet in Gramineæ (grasses) and Cyperaceæ (sedges). The glume forms the husk or chaff of grain, called also the *palea* or *pale*.

Gluten, a tough elastic substance of a grayish colour, which becomes brown and brittle by drying, found in the flour of wheat and other grain. It contributes much to the nutritive quality of flour, and gives tenacity to its paste. A similar substance is found in the juices of certain plants.

Glutton, the *Gulo arcticus*, a carnivorous quadruped, about the size of a large badger, and intermediate between the bear family (Ursidæ) and the weasels (Mustelidæ), resembling the former family in general structure and the latter in dentition. It inhabits Northern Europe and America, and is known also by the name of *Wolverene* or *Wolverine*. The glutton is slow and deficient in agility, but persevering, cunning, fierce, and of great strength. It prefers putrid flesh, and has an extremely fetid odour. The fur is valuable, that from Siberia being preferred from its being of a glossy black. The animal receives its name from its voracity, which, however, has been greatly exaggerated.

Glycerine ($C_3H_8O_3$), a transparent colourless liquid, chemically described as a triatomic or trihydric alcohol, obtained from the bye-products of candle and soap factories by saponification with alkalies or by the action of superheated steam. It has a sp. gr. 1·267, and sometimes solidifies at a low temperature to a crystalline mass. It absorbs moisture from the air, and dissolves in or mixes with water and alcohol in all proportions, but is insoluble in ether. It acts as a solvent both on inorganic and organic bodies. The uses of glycerine are very numerous. Its applications in pharmacy are almost endless; as an external application in chaps, rough skin, chafing, &c., it is much used. Internally it is frequently prescribed in combination with iron, and also as a substitute for cod-liver oil, and in cases of diabetes. In the arts it is used wherever a substance requires to be kept more or less moist, for example modelling clay, tobacco, paper for printing, &c.; also in spinning, weaving, rope-making, and tanning. It is an excellent preservative medium for meat, and for natural history specimens; and its property of lowering the freezing-point of water makes it useful in gas-meters, floating-compasses and the like. It is also the starting-point of certain valuable chemical products, one of the chief of which is nitro-glycerine.

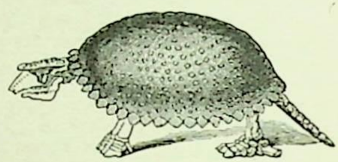
Gly'cogen, in organic chemistry and physiology, a proximate non-nitrogenous principle occurring in the epithelial cells of the liver, where it exists as an amorphous matter. In properties it seems to be intermediate between starch and dextrine, and in contact with saliva, pancreatic juice, diastase, or with the blood or parenchyma of the liver, it is converted into glucose.

Gly'col ($C_2H_6O_2$), the type of a class of artificial compounds intermediate in their properties and chemical relations between alcohol and glycerine, or the bodies of which these are the types. Otherwise expressed, glycol is a diatomic acid, alcohol being a monatomic and glycerine a triatomic. It is liquid, inodorous, of a sweetish taste, and insoluble in water and alcohol.

Gly'con, an Athenian sculptor known by his colossal marble statue of Heracles, commonly called the 'Farnese Hercules,' now in the museum at Naples. He probably lived in the 1st century B.C.

Glycyrrhiza (gli-si-rī'za), a genus of leguminous plants, of which *G. glabra*, the liquorice plant, is the type.

Glyp'todon (Gr. *glyptos*, engraved, and *odous*, tooth—so named from its fluted teeth), a gigantic fossil edentate animal, closely



Glyptodon (*Glyptodon clavipes*).

allied to the armadilloes, found in the upper tertiary strata of South America. It was of the size of an ox, and was protected by a coat of mail formed of polygonal osseous plates united by sutures.

Gmelin (gmel'in), JOHANN GEORG, a German naturalist, born in Tübingen 1709, died 1755. On taking his medical degree he went to St. Petersburg, and became professor of chemistry and natural history. In 1733, at the expense of the Empress of Russia, he took part in an exploring expedition to Siberia, returning to St. Petersburg in 1743, where he published his Flora of Siberia. He became professor of botany and chemistry at Tübingen in 1749, and published Travels in Siberia (1752).—His nephew, SAMUEL GOTTLIEB, botanist and traveller, was born in 1744 at Tübingen, where he studied physic, and, in 1763, took the degree of doctor of medicine. He obtained a professorship of botany at St. Petersburg about 1766, and published a Historia Fucorum, 1768. He travelled in Asia, and being imprisoned by the Khan of the Chaitaks, he died in confinement in 1774. His Travels appeared in 1770–84.—Another nephew, JOHANN FRIEDRICH, was born 1748, died 1804. He was professor of medical science

at Göttingen for about thirty years; published a Dictionary of Botany, History of Natural Sciences, and edited an edition of Linnæus.

Gmeli'na, an Asiatic genus of plants belonging to the order Verbenaceæ. All the species form shrubs or trees, some of the latter affording very valuable timber.

Gmünd (gmünt), a town of Würtemberg, on the Rems, 28 miles E.N.E. of Stuttgart, formerly an imperial free city. It has three churches of great antiquity, and an extensive museum of industrial products. The manufactures are chiefly woollen and cotton goods, jewelry, and trinkets. Pop. 15,321.

Gmunden (gmun'den), a town of Upper Austria, situated among magnificent scenery, on the Traun, where it issues from the northern extremity of the lake of that name, 35 miles south-west of Linz. Most of the inhabitants are employed in the neighbouring salt-mines. Gmunden is a favourite health-resort and summer residence. Pop. (commune), 6631.

Gnapha'lium, a genus of widely-spread composite plants having their foliage usually covered with a white woolly down, and their flower-heads of the 'everlasting' kind, some of them natives of Britain. *G. Leontopodium* (*Leontopodium alpīnum*) is the *edelweiss* of the Alps (which see).

Gnat, the name applied to several species of insects of the genus *Culex*. The common gnat (*C. pipiens*), type of the sub-family Culicidæ, is of wide geographical distribution, and is noted for its power of inflicting irritating wounds. The proboscis or sting of the female is a tube containing four spiculæ of exquisite fineness, dentated or edged; these are modified mandibles and maxillæ. The males do not sting, and are further distinguished by their plume-like antennæ. These insects also feed on the juice of plants. The female deposits her eggs on the surface of stagnant water in a long mass. After having remained in the larva state for about twenty days, they are transformed into chrysalids, in which all the limbs of the perfect insect are distinguishable, through the diaphanous robe with which they are then shrouded. After remaining three or four days wrapped up in this manner, they become perfect insects. The troublesome mosquito belongs to the same genus.

Gneisenau (gnī'zn-ou), AUGUST WILHELM ANTON, COUNT NEIDTHARD VON, Prussian general, born 1760, died 1831. He served with the German auxiliaries of England in America; and as chief of Blücher's staff chiefly directed the strategy of the Prussian army at Waterloo. He was made field-marshal in 1831.

Gneiss (nīs), a species of rock, composed of quartz, felspar, and mica, arranged in layers. The layers, whether straight or curved, are frequently thick, but often vary considerably in the same specimen. Gneiss passes on one side into granite, from which it differs in its foliated structure, and on the other into mica slate. It is rich in metallic ores, gold, silver, cobalt, antimony, copper, iron, &c., occurring in this rock, but it contains no fossil remains. Porphyritic gneiss presents large distinct crystals of felspar which traverse several of the foliated layers. Gneiss often contains hornblende in place of mica, and then receives the name of syenitic gneiss. The only difference between this rock and granite consists in the foliation of gneiss, the materials of granite being crystallized promiscuously, those of gneiss being segregated in layers. It is the principal rock of very extensive districts; it predominates in Norway, and all the north of Europe. It abounds in the Southern Alps and the Pyrenees, and forms the loftiest chains of the Andes of Quito. In the United States, also, gneiss is a common rock, especially in New England and the eastern and southern parts of New York.

Gneist (gnīst), HEINRICH RUDOLF HERMANN FRIEDRICH, German jurist, born at Berlin 1816, studied at the university there, in which, in 1844, he became professor-extraordinary, and in 1858 ordinary professor. He took part in politics as a member of the Prussian House of Deputies, and of the diet of the German Empire, ranging himself on the liberal side. He wrote extensively on law, constitutional history, &c., and had a specially thorough knowledge of English constitutional history, his works on the English Constitution and the English Parliament having been translated and published in England in 1886. He died in 1895.

Gnesen (gnā'zn), a town of Prussia, province of Posen, 45 miles south-west of Bromberg. It is an ancient place; is the see of an archbishop, and has a cathedral, in which the kings of Poland used to be crowned. Pop. 15,787.

Gnome (nōm; Greek, *gnōmē*), a short, pithy saying, often expressed in figurative language, containing a reflection, a practical observation, or a moral maxim. Among the Greeks Theognis, Phocylides, and others,

are called the *Gnomic poets*, from their sententious manner of writing.

Gnome (nōm), in the cabalistic and mediæval mythology, the name given to the spirits which dwell in the interior of the earth, where they watch over mines, quarries, and hidden treasures. They assume a variety of forms, but are generally grotesque dwarfs, ugliness being their appropriate quality, though the females, *gnomides*, are originally beautiful.

Gnomon (nō'mon), the style of a dial, or a structure erected perpendicularly to the horizon, from whose shadow the altitudes, declinations, &c., of the sun and stars may be determined. The gnomon is usually a pillar or column or pyramid erected upon level ground. It was much used by the ancient astronomers, and gnomons of great height, with meridian lines attached to them, are still common in France and Italy.

Gnomonics (nō-mon'iks), the art and theory of making sun-dials on true scientific principles.

Gnostics (nos'tiks; Greek, *gnosis*, knowledge), a general name applied to early schools of speculators, which combined the fantastic notions of the oriental systems of religion with the ideas of the Greek philosophers and the doctrines of Christianity. They nearly all agreed on the points that God is incomprehensible; that matter is eternal and antagonistic to God; that creation is the work of the *Demiurge*, an emanation from the Supreme Deity, subordinate or opposed to God; and that the human nature of Christ was a mere deceptive appearance. Certain forms of Gnosticism are mere adaptations of the Persian dualism to the solution of the problem of good and evil; while the pantheism of India seems to have been a pervading influence in others. Simon the magician (Simon Magus), of whom Luke speaks in the Acts of the Apostles, is generally looked on as the first of the Gnostics. The dogmas of the earliest Gnostics may be reduced to the following heads:—God, the highest intelligence, dwells at an infinite distance from this world, in the Abyss, removed from all connection with every work of temporal creation. He is the source of all good; matter, the crude, chaotic mass of which all things were made, is, like God, eternal, and is the source of all evil. From these two principles, before time commenced, emanated beings called *æons*, which are described as divine spirits, inhabiting the Plerōma, or plenitude of light, which surrounds the Abyss. The world and the human race were created out of matter by one æon, the Demiurge, or, according to the later systems of the Gnostics, by several æons and angels. The æons made the bodies and the sensual soul of man of this matter; hence the origin of evil in man. God gave man the rational soul; hence the constant struggle of reason with sense. What are called gods by men (for instance, Jehovah, the God of the Jews) are merely such æons or creators, under whose dominion man became more and more wicked and miserable. To destroy the power of these creators, and to free man from the power of matter, God sent the most exalted of all æons, to which character Simon first made pretensions. The Nicolaitans mentioned in the Revelation of St. John, so called from Nicolas, a deacon of the church at Jerusalem, were one of the earliest sects, and are described as forerunners of the Cerinthians. Cerinthus, a Jew, of whom John the evangelist seems to have had some knowledge, combined such reveries with the doctrines of Christianity, and maintained that the most elevated æon sent by God for the salvation of man, was Christ, who had descended upon Jesus, a Jew, in the form of a dove, and through him revealed the doctrines of Christianity, but before the crucifixion of Jesus separated from him, and at the resurrection of the dead will again be united with him, and lay the foundation of a kingdom of the most perfect earthly felicity, to continue 1000 years. Carpocrates and the sect of the Ophites (beginning of the 2d century), to whom the term Gnostic was first applied, saw in the Serpent a wise and good being, and carried to its extreme form the inversion of the biblical story. The later Gnostics have been divided into three schools. The first was the Syrian, founded by Menander, a pupil of Simon. This school emphasizes the conflict between Good and Evil —the Supreme Deity on the one hand, and the Demiurge and his angels or æons on the other. The second was the school of Alexandria, represented by Basilides and Valentinus; the system of the latter being the most complete and ingenious of all. In that light or plenitude, which all the Gnostics speak of as surrounding the residence of the Supreme God, he has placed fifteen male and as many female æons. The Supreme God, the Unbegotten, the Original Father, whom he also calls the *Deep* (Bathos), is the first of these æons; Thinking Silence

was his wife, and Intelligence, a male, and Truth, a female, were their children. These produced The Word and Life, the latter a female, who gave birth to mankind and society. These eight constituted the first class of the thirty æons. The second class, of five couples, at the end of which stood the Only Begotten, and the third, of six couples, at the head of which stood the Comforter, were, in a similar manner, descended from Mankind and Society, and consisted, like the first, of personified ideas. The officers of this heavenly state are four male æons—Horus, who guards the boundaries of the region of light; Christ and the Holy Ghost, who instruct the other æons in their duties; and Jesus, whom all the æons of the kingdom of light begat in common, and endowed with their gifts. Man and the world were formed by a demiurge out of matter which was partly material, partly spiritual, partly soul-like. Christ, the Saviour of men, when he appeared on earth had a visible body made of the spiritual and the soul-like substance only. At his baptism the æon Jesus united itself with him, and instructed mankind. A third school of Gnosticism, whose centre was Asia Minor, was represented by Marcion of Pontus, the son of a Christian bishop, who flourished about the middle of the 2d century. Marcion assigned to Christianity, as the one absolutely independent religion, a complete isolation from the Old Testament revelation, the author of which was, in his opinion, merely a just but not a good being. The true God begat many spirits, among which were the creator of the world, the righteous God, and the lawgiver of the Jews. The last, through the prophets, promised Christ; but Jesus, who actually appeared, and is the true Redeemer, was the Son of the truly good God, and not the Jewish Messiah. Towards the end of the 2d century Tatian, a Syrian Christian, adopted Gnostic doctrines, and founded a sect. Bardesanes, a Syrian, and Hermogenes, an African, who, in the reign of the Emperor Commodus, apostatized from Christianity, and established sects, bordered, in their hypotheses concerning the origin of good and evil, upon Gnosticism. There have been no Gnostic sects since the 5th century; but many of the principles of their system of emanations reappear in later philosophical systems, drawn from the same sources as theirs.

Gnu, the *Wildebeeste* ('wild beast') of the colonists, the name given to two species of South African antelope (*Catoblĕphas gnu*, and *C. gorgon*). The former species is now rarely found south of the Vaal; its form partakes of that of the antelope, ox, or horse. Both sexes have horns projecting slightly outwards and downwards, then forming an abrupt upward bend. They have bristly black hair about the face and muzzle, a white stiff mane, and horse-like tail. They attain a length of about nine feet, and stand about four feet high at the shoulder. They live in herds; are said to be fierce when attacked, but when taken young have been found to be capable of domestication. The brindled gnu (*C. gorgon*) is larger than the common gnu, has black stripes on the neck and shoulders, and a black tail. Both species wheel in a circle once or twice before setting off when alarmed.



Gnu (*Catoblephas gnu*).

Goa, a city in Hindustan, on the Malabar coast, capital of the Portuguese territory of the same name. The name is applied to two distinct places, namely, Old Goa, and New Goa or Panjim. The former was once the chief emporium of commerce between the East and West, and had a population of 200,000, but it is now nearly deserted, though some pains are taken to keep the ancient churches and convents in repair; pop. 1882. New Goa or Panjim was chosen as the residence of the Portuguese viceroy in 1759; and in 1843 it was made the capital of Portuguese India. It is situated on the left bank of the Mandavi, about 3 miles from its mouth, contains many fine public buildings, cathedral, viceregal palace, &c. The trade of Goa, at one time the most extensive of any place in India, is now inconsiderable. Pop. 8440. The territory

around Goa belonging to the Portuguese has an area of 1062 sq. miles. It is well watered and fertile. About two-thirds of the total population, numbering 445,449, are the descendants of Hindus converted to Christianity on the subjugation of the country by the Portuguese.

Goalan'da, a river mart and municipality of Bengal, at the confluence of the main streams of the Ganges and Brahmaputra. Pop. 8652.

Goalpa'ra, a district of British India, prov. of Assam; area 3897 sq. miles; pop. 452,304. It lies on both sides of the Brahmaputra, and is exposed to river floods. Rice is the staple crop; and brass and iron utensils, gold and silver ornaments, &c., of an artistic character are manufactured. The town of Goalpara is the chief centre of trade. Pop. 11,490.

Goa Powder, a powder used in the treatment of certain skin diseases, obtained from the pith of a leguminous tree, a species of *Centrolobium*, and called also Araroba Powder.

Goat, a well-known horned ruminant quadruped of the genus *Capra*. The horns are hollow, erect, turned backward, annular on the surface, and scabrous. The male is



Goat of Cashmere

generally bearded under the chin. Goats are nearly of the size of sheep, but stronger, less timid, and more agile. They frequent rocks and mountains, and subsist on scanty coarse food. Their milk is sweet, nourishing, and medicinal, and their flesh furnishes food. Goats are of almost interminable variety, and it is not certainly known from which the domestic goat is descended, though opinion favours the *C. ægagrus*, or wild goat of Western Asia. Goats are generally subdivided into ibexes and goats proper. They are found in all parts of the world, and many varieties are valued for their hair or wool. The skin is prepared for a variety of purposes, and yields the leather well known under the name of *morocco*. The Cashmere goat, as its name indicates, is a native of Cashmere; it is smaller than the common domestic goat, and has long, silky, fine hair. The Angora goat is also furnished with soft silky hair of a silver-white colour, hanging down in curling locks 8 or 9 inches long. Its horns are in a spiral form, and extend laterally. The Rocky Mountain goat is the *Haplocĕrus montānus*, or big-horn (which see).

Goat Island, a small island of 70 acres, which divides the current of the Niagara River at the Falls. It is connected with the American shore by a bridge.

Goat-moth, a large British moth (*Cossus ligniperda*). The larvæ, which are about 3 inches in length, hollow out galleries in the wood of trees, which they first soften by a juice of a strong smell which they secrete. With the saw-dust made in the operation they form cocoons, in which the chrysalids are developed. The larval condition lasts for three years. The fully-developed insect is ash-coloured, with numerous small black lines on the first pair of wings.

Goat's-beard, the general name of plants of the genus *Tragopōgon*, order Compositæ, herbaceous perennials, chiefly natives of Europe. The seeds have feathery appendages; hence the name. The yellow goat's-beard (*T. pratensis*), greater goat's-beard (*T. major*), and purple goat's-beard (*T. porrifolius*) are found in Britain. The latter species is commonly cultivated for its root as a culinary vegetable, under the title of *salsify*.

Goat's-rue (*Galēga officinālis*), a leguminous plant indigenous to the south of Europe. It is used as forage, and is supposed to increase the milk of cows that feed upon it. It was formerly in repute as a cordial for fevers and convulsions.

Goat's-thorn, a name given to two hardy evergreen plants of the genus *Astragălus*. *A. Tragacantha* (great goat's-thorn), and *A. Poterium* (small goat's-thorn). The former, long cultivated in Great Britain, is a native of the south of Europe, the latter of the Levant.

Goatsucker, a name common to the birds of the genus *Caprimulgus*, as also to all belonging to the same family—the Caprimulgidæ, given originally from the erroneous opinion that they suck goats. The Euro-

pean goatsucker (*C. europæus*) feeds upon nocturnal insects, as moths, gnats, beetles, &c., which it catches on the wing, flying with its mouth open. Its mouth is comparatively large, and lined on the inside with a glutinous substance to prevent the escape of those insects which fly into it. Like all birds which catch flies when on the wing, the gape is surrounded by stiff bristles. When perched, it usually sits lengthwise on a bare twig, with its head lower than its tail, and in this attitude utters a jarring note, whence one of its common names—*night-jar*, or *night-churr*. It has a light, soft plumage, minutely mottled with gray and brown, and is about 10 inches in length. The American chuckwill's widow, whip-poor-will, and night-hawk belong to the same family.

Gobelins (gob-lan) **Manufactory,** a tapestry manufactory at Paris, established by Colbert in 1667, on the site of a previously existing manufactory which had been set up by Gilles Gobelin, a celebrated dyer in the reign of Francis I. Colbert collected into it the ablest workmen in the divers arts and manufactures connected with house decoration and upholstery. The Gobelins has since then continued to be the first manufactory of the kind in the world. Many celebrated paintings of the old Italian, French, and Spanish schools have, in the most ingenious manner, been transferred to tapestry.

Gobi, DESERT OF, the *Shamo* or 'sand-sea' of the Chinese, an immense tract of desert country, occupying nearly the centre of the high table-land of Eastern Asia, between lat. 37° and 48° N., and lon. 95° and 118° E., and extending over a large portion of the Chinese territory of Mongolia. Its length is probably about 1000 miles; mean breadth, between 350 and 400 miles; area, 360,000 sq. miles. Its general elevation is over 4000 feet above sea-level. The East Gobi is occupied by different tribes of the Mongolian race, who have numerous herds of camels, horses, and sheep. In the West Gobi are some nomadic tribes of the Tartar race. This tract is supposed at one time to have been a great inland sea.

Goblin, a spirit of popular superstition, generally malignant in nature and grotesque in appearance; much the same as a gnome.

Goby, the general name of a family of acanthopterous fishes (Gobiidæ) characterized as follows:—Two dorsal fins nearly united into one, the anterior fin having flexible rays, not spinous, as is usual in the Acanthopterygians; ventral fins thoracic, and united more or less by their bases; body scaly, the head unarmed. Like the blennies they can live for some time out of water. The family is very numerous, about 400 species being known, but does not include any important food fishes. The gobies are among the nest-building fishes. The black goby is very common on the British coasts.

God, the self-existent, eternal, and Supreme Being, the creator and upholder of the universe, worshipped by most civilized nations. The Christian God is an infinite and absolute being; a perfect personal spirit; eternal; immutable; omniscient; omnipotent; and perfectly good, true, and righteous. The arguments for the existence of God have been divided into the ontological, the cosmological, the psychological, the physico-teleological, and the moral. The ontological argument starts from the idea of God itself, and professes to demonstrate the existence of God as a necessary consequence from that idea. This form of argument is, in some shape or other, a very old one, but was first fully developed and applied by Anselm in the 11th century. The manner in which it was stated by Anselm is this: 'God must be thought of as that being than whom none can be thought greater; but this being the highest and most perfect that we can conceive, may be thought as existing in actuality as well as in thought —that is to say, may be thought as something still greater; therefore God, or what is thought as greatest, must exist not only in thought but in fact.' This argument has been presented in other forms. Descartes, while refuting Anselm's form of the ontological argument, revived it himself in another form. Applying the test of truth which he derived from his celebrated formula—'I think, therefore I am,' that whatever we clearly and distinctly perceive to belong to the true and unalterable nature of a thing may be predicated of it, he found on investigating God that existence belongs to his true and unalterable nature, and therefore may legitimately be predicated of him. Another argument was adduced by Descartes to prove the existence of God, which, although not the same with the ontological argument, appears to resemble it. It is called the psychological argument. Like the ontological argument, it starts from the idea of a supreme and perfect being, but it does not assert the objective existence of that being as implied in its

idea, but infers such objective existence on the ground that we could have acquired the idea only from the being which corresponds to it. The cosmological argument starts not from an idea, but from a contingent existence, and infers from it an absolutely necessary being as its cause. Stated syllogistically the argument is: Every new thing and every change in a previously existing thing must have a cause sufficient and pre-existing. The universe consists of a system of changes. Therefore the universe must have a cause exterior and anterior to itself. The argument called the physico-teleological is that which is commonly known as the argument from design, which has been so fully illustrated by Paley in his Natural Theology. It is simply this, that in nature there are unmistakable evidences of the adaptation of means to ends, which lead us inevitably to the idea of one that planned this adaptation, that is, of God. The moral argument is derived from the constitution and history of man and his relations to the universe, being based on such considerations as our recognition of good and evil, right and wrong, the monitions of conscience, and the fact that a moral government of the world may be observed. Another argument is based on the (alleged) fact that a belief in the existence of a Supreme Being is everywhere found to be implanted in the breast of man. This argument is used among others by Cicero, and many thinkers are inclined to give a good deal of weight to it; still it is pronounced by others to be at best only a probable argument, if it may be accepted as valid to prove anything at all. Others argue the existence of God from the manifestations which he has made of himself to men, but these, as well as miracles, it is admitted even by Christian theists, can only be accepted as real by such as previously believed in the divine existence.

Goda'vari, a large river of Central India, which rises about 50 miles from the shore of the Indian Ocean, flows across the Deccan from the Western to the Eastern Ghats in a general south-easterly direction, and being joined by several affluents, falls by three principal mouths into the Bay of Bengal, after a course of 900 miles. Before the river divides there are three great obstacles to navigation, caused by three rocky barriers. —GODAVARI is also the name of a British district of the Madras Presidency; area, 7857 sq. miles; pop. 2,078,782. Coringa and Coconada are its chief ports.

Godfather AND Godmother. See *Sponsors*.

Godfrey, SIR EDMONDBURY, the magistrate who received the depositions of Titus Oates with regard to the alleged Popish plot, Sept. 28, 1678. He was soon after found dead, pierced with his own sword, though evidently not by his own hand. His death was imputed to the resentment of the Papists, and the excitement aroused was the actual cause of the Popish Plot agitation.

Godfrey of Bouillon, leader of the first crusade, son of Eustace II., count of Boulogne, born near Nivelles, 1061; died at Jerusalem, 1100. He distinguished himself while fighting for the Emperor Henry IV. in Germany and Italy, and was made Duke of Bouillon. In order to expiate his sin of fighting against the pope, he took the cross for the Holy Land in 1095, and led 80,000 men to the East by way of Constantinople. On the 1st of May, 1097, they crossed the Bosporus, and began their march on Nice (Nicæa), which they took in June. In July the way to Syria was opened by the victory of Dorylæum (Eski Shehr), in Phrygia, and before the end of 1097 the crusaders encamped before Antioch. The town of Antioch fell into their hands in 1098, and in the following year Godfrey took Jerusalem itself, after a five weeks' siege. The leaders of the army elected him king of the city and the territory; but Godfrey would not wear a crown in the place where Christ was crowned with thorns; and contented himself with the title of *duke* and *guardian of the holy sepulchre*. The defeat of the Egyptians at Ascalon placed him in possession of all the Holy Land, excepting two or three places. Godfrey now turned his attention to the organization of his newly-established government, and promulgated a code of feudal laws called the *Assize of Jerusalem*. Godfrey was a favourite subject of mediæval poetry, and is the central figure of Tasso's 'Jerusalem Delivered.'

Godfrey of Strasburg, a German poet, who flourished about 1200, was probably born in Strasburg, but at any rate lived there. Besides many lays, we are indebted to him for the great chivalric poem, Tristan und Isolde, derived from the legends of the Round Table.

Gōdi'va, the wife of Leŏfric, earl of Mercia and lord of Coventry in the reign of Edward the Confessor, heroine of a celebrated tradition. In 1040 certain exactions imposed on the inhabitants bore heavily on them, and

Godiva interceded for their relief. Leofric, however, only laughed at her, and when she persisted in her entreaties at last said to her, half jocularly, that he would grant her request if she would ride naked through the town of Coventry. Godiva took her husband at his word, proclaimed that on a certain day no one should leave his house before noon, that all windows and other apertures in the houses should be closed, and that no one should even look out until noon was past. She then mounted naked on her palfrey, rode through the town, and returned; and Leofric, in fulfilment of his promise, freed the inhabitants from the burdens he had imposed on them. Only one person, 'Peeping Tom,' the story says, attempted to look out, and he was immediately struck blind. A yearly pageant, in which a young woman enacted the part of Godiva, was long kept up at Coventry, and still occasionally takes place. Tennyson's poem on Godiva is well known.

Godmother. See *Godfather.*

Godol'phin, Sidney, Earl of Godolphin, English politician, was a native of Cornwall, date of birth unknown, probably 1635. Under Charles II., he was one of those who voted for the exclusion of the Duke of York from the throne in 1680. He nevertheless retained office under that monarch, as he did also under William III., with whom he had long been in correspondence. During the reign of Anne he was appointed lord high-treasurer of England, and in this office did much to improve the public credit, and check corruption in the administration of the public funds. In 1706 he was made Earl of Godolphin, and four years afterwards was obliged to retire from office. His death took place in 1712. He was a man of great business capacity, but his treasonable correspondence with James while he held an office of trust under William of Orange is a serious blot upon his character.

Godoy, Manuel, Duke of Alcudia, better known as the *Prince of the Peace*, was born at Badajoz 1767, died 1851. He entered the royal body-guards in 1787. His personal qualities soon made him a favourite at the Spanish court, and his promotion was rapid. In 1791 he became adjutant-general of the guards, in 1792 lieutenant-general, Marquis of Alcudia, grandee of Spain of the first class, and prime-minister; and in 1795, as a reward for the part he had taken in concluding peace with France, he was presented with a large and valuable landed estate, and made a knight of the Golden Fleece. It was on this occasion also that he was named by the king Prince of Peace. As he used his vast power in the promotion of French more than Spanish interests, he became extremely unpopular, and the hatred of the people became so great in 1808 that he had to take refuge in France. Having lost everything, he lived for a long time only on the bounty of his royal friends. In 1847 he was permitted to return to Spain and resume his titles. The larger portion of his domains, however, was irrecoverably lost, and he ended his days in obscurity and poverty.

God save the King (or Queen), the burden and common appellation of a well-known English national song. Concerning the author and the composer opinions differ. It has been attributed to Dr. John Bull, chamber musician to James I.; his ode, dating from the gunpowder plot, beginning 'God save great James our King.' But the composition we now possess would seem to have been, both words and melody, the work of Henry Carey (died 1743). It appears to have been first published, together with the air, in the Gentleman's Magazine in 1745, when the landing of the young Stuart called forth expressions of loyalty from the adherents of the reigning family. After Dr. Arne, the composer of another national song (Rule, Britannia), had brought it on the stage, it soon became very popular. Since that time the harmony of the song has undoubtedly been improved, but the rhythm is the same as originally.

Godwin, Earl of Wessex, an Anglo-Saxon noble, born about 990; died 1052. In 1018 he was created an earl by Canute, and married the king's niece Gytha. During the reign of Edward the Confessor, who married Godwin's daughter, a quarrel arose between Godwin and the king, occasioned by the partiality of Edward for Norman favourites, and Godwin was compelled to quit the kingdom. In 1052, however, he returned with an army, forced Edward to enter into negotiations with him, re-established himself triumphantly in his old supremacy, and caused the expulsion from the kingdom of most of the Norman intruders. He was the father of Harold, the last Anglo-Saxon king.

Godwin, Mary, also well known by her maiden name of Wollstonecraft, born in or near London in 1759, died 1797. Her early training was very defective, but fitting her-

self for a teacher, she set up a school, in conjunction with her sisters, at Islington in 1783. In 1786 she published Thoughts on the Education of Daughters. This was followed by an answer to Burke's Reflections on the French Revolution, the Vindication of the Rights of Woman, and other works. She had peculiar ideas on marriage, and formed a somewhat loose connection with an American of the name of Imlay, whose desertion caused her to attempt suicide. Some time after she fixed her affection on William Godwin (see next art.). As the bonds of wedlock were deemed a species of slavery in her theory, it was only to legitimize the forthcoming fruits of the union that a marriage between the parties took place. She died in giving birth to a daughter, who afterwards became the wife of Shelley the poet. Among her other works are a Moral and Historical View of the French Revolution, and Letters from Sweden, Norway, and Denmark.

Godwin, WILLIAM, English novelist and political writer, son of a Dissenting minister, was born 1756, died 1836. In 1778 he became the minister of a Dissenting congregation near London, and continued in that capacity for five years, after which he removed to London, where he set himself to gaining his livelihood by literary labours. In 1793 appeared his Inquiry concerning Political Justice, the liberal tone of which exposed him to some danger of a government prosecution. The next year appeared his novel of Caleb Williams, or Things as they Are, which rapidly and deservedly attained an immense popularity. His Cursory Strictures on Judge Eyre's Charge to the jury in the trial for high treason of Holcroft, Horne Tooke, and others, contributed materially to the acquittal of his friends. In 1797 he published the Inquirer, a collection of essays on moral and literary subjects; and in April of the same year he married Mary Wollstonecraft (see preceding art.). A memoir of his wife was published by Godwin in 1798, along with her posthumous literary works. In 1799 he published a new novel, St. Leon. Among his subsequent works are: Faulkner, a tragedy, published in 1807; an Essay on Sepulchres, in 1808; Mandeville, a novel, in 1817; A Treatise on Population, in reply to Malthus, in 1820; History of the Commonwealth of England, 1824–28; Cloudesley, a novel, in 1830; Thoughts on Man, in 1831; and Lives of the Necromancers, in 1834. In the latter years of his life Godwin held a clerkship in the record office.

Godwin'ia, a genus of plants, of the natural order Araceæ. A gigantic species (*G. gigas*) discovered in Nicaragua produces but one very large and very deeply cut leaf supported on a stalk 10 feet long. The inflorescence appears at a different time from the leaf, and consists of a stalk about 10 inches high supporting the spathe or flower 2 feet long, purplish-blue in colour, with a powerful carrion-like odour.

Godwit, the common name of the members of a genus of grallatorial birds (*Limōsa*), family Scolopacidæ (snipes). There are several species, of which two are British, viz. the common godwit (*L. melanura*) and the red godwit (*L. rufa*). There are besides the great American godwit, the cinereous godwit, the black-tailed godwit, the red-breasted godwit, &c. The common godwit frequents fens and the banks of rivers, and its flesh is esteemed a great delicacy.

Goes (*hös*), or TERGOES, a fortified town and port in Holland, in the province of Zeeland, on the island of South Beveland, 16 miles west of Bergen-op-Zoom. It has a considerable commerce, but unimportant manufactures. Pop. 11,558.

Goethe (*geu'tė*), JOHANN WOLFGANG VON, the greatest figure in German literature, was born August 28, 1749, at Frankfort-on-the-Main, died at Weimar, March 22, 1831. His father, who was a Doctor of Laws and imperial councillor, was a well-to-do citizen and an admirer of the fine arts. The Seven Years' war broke out when Goethe was eight years old, and Count de Thorane, *lieutenant du roi* of the French army in Germany, was quartered in the house of his father. The count, being an amateur and liberal patron of art, encouraged the boy's incipient taste for pictures. At the same time young Goethe learned the French language practically; and a French theatrical company, then performing at Frankfort, awakened his taste for dramatic performances. Drawing, music, natural science, the elements of jurisprudence, and the languages, occupied him alternately. After the breaking off of a youthful love affair, which gave a name to the heroine of his great work Faust and some features to his Wilhelm Meister, he was sent to the University of Leipzig to prepare himself for the legal profession, but he did not follow any regular course of studies. Goethe began at this period, what he practised throughout his

life, to embody in a poem, or in a poetical form, whatever occupied his mind intensely; and no one, perhaps, was ever more in need of such an exercise, as his nature continually hurried him from one extreme to another. In 1768 he left Leipzig, and after an illness of some length he went in 1770 to the University of Strasburg, to pursue the study of law, according to the wish of his father. At Strasburg he became acquainted with Herder—a decisive circumstance in his life. Herder made him more acquainted with the Italian school of the fine arts, and inspired his mind with views of poetry more congenial to his character than any which he had hitherto conceived. While here he fell in love with Frederica Brion, daughter of the pastor of Sesenheim, but the affair, though it made a more abiding impression on him than some others, resulted in nothing. Goethe's numerous love affairs form one of the most curious studies in biography. His attachments were all fugitive; the love passion was continuous, but the object was ever changing. In 1771 he took the degree of Doctor of Jurisprudence, and wrote a dissertation on a legal subject. He then went to Wetzlar to practise law, where he found, in his own love for a betrothed lady, and in the fate of a young man named Jerusalem, the subjects for his striking work, The Sorrows of Werther, which formed an epoch in German literature. The attention of the public had already been attracted to him, however, by his drama Götz von Berlichingen (published 1773). Werther appeared in 1774. Not long after the publication of Werther, Charles Augustus, the hereditary duke of Saxe-Weimar, made the acquaintance of Goethe on a journey, and when in 1775 he took the government into his own hands, he invited Goethe to his court. Goethe accepted the invitation, and on the 7th of November, 1775, arrived at Weimar. Wieland was already there, having been the duke's tutor: Herder was added to the band in 1776; Schiller was afterwards one of its members for a few years; and other poets and critics and novelists were gathered round these chiefs. Goethe was the leading spirit of the group even during the last quarter of the 18th century, when these men and others were constructing and guiding the literature of all Germany; and his supremacy became yet more absolute afterwards, when for another generation he stood alone. In 1776 he was made privy-councillor of legation, with a seat and vote in the privy-council. In 1782 he was made president of the chamber, and ennobled. In 1786 he made a journey to Italy, where he remained two years, visited Sicily, and remained a long time in Rome. This residence in Italy had the effect of still further developing his artistic powers. Here his Iphigenia was matured, Egmont finished, and Tasso projected. The first of these was published in 1787, the second in 1788, and the third in 1790. In the same year with Tasso was published the earliest form of the first part of Faust, with the title Dr. Faust, ein Trauerspiel (Dr. Faust, a Tragedy), a poem in a dramatic form, which belongs rather to Goethe's whole life than to any particular period of it. At the time that Goethe was engaged in the production of these works of imagination he had been pursuing various other studies of a scientific nature with as ardent an interest as if these had belonged to his peculiar province. The result of his studies in botany was a work published also in 1790, Versuch die Metamorphose der Pflanzen zu Erklären (Attempts to Explain the Metamorphosis of Plants), in which he gives expression to the view that the whole plant, and its different parts, may all be regarded as variously modified leaves. In the following year (1791) he began to apply himself to optics, and in 1791–92 he published a work on this subject called Beiträge zur Optik. On the 1st of May, 1791, he became director of the court theatre at Weimar. In 1792 he followed his prince during the campaign of the Prussians against the revolutionary party in France, and was present at the battle of Valmy on the 20th of September. At the Weimar theatre he brought out some of the dramatic chefs-d'œuvre of Schiller, and there, too, his own dramatic works first appeared, Goetz von Berlichingen, Faust, Iphigenia in Taurus, Tasso, Clavigo, Stella, and Count Egmont. In 1794–96 Goethe published Wilhelm Meister's Lehrjahre (Wilhelm Meister's Apprenticeship), a novel which has become well known to English readers through the translation of Carlyle, and which had as a continuation Wilhelm Meister's Wanderjahre (that is, his travels as a journeyman; 1821). His next work of importance was Hermann und Dorothea (1797), a narrative poem, in hexameter verse, the characters of which are taken from humble life. In 1806 Goethe married Christiane Vulpius, with whom he had lived since 1788, and of whom he always spoke with warmth

and gratitude for the degree in which she had contributed to his domestic happiness. In 1808 he published another edition of Faust in a considerably altered form. In 1809 was published Wahlverwandtschaften (Elective Affinities), another novel, and in 1810 the Farbenlehre or Theory of Colours, a work in which he had the boldness to oppose the Newtonian theory, and to which Goethe himself attached great importance, although the theory therein promulgated has met with no acceptance among men of science. In 1811-14 appeared Goethe's autobiography, with the title Aus meinem Leben: Dichtung und Wahrheit; in 1819 the Westöstlicher Divan, a remarkable collection of oriental songs and poems. Goethe's last work was the second part of Faust, which was completed on the evening before the last anniversary of his birthday which he lived to see. Goethe's works taken altogether form a rich constellation of poetry, romance, science, art, and philosophy. His greatest production is his Faust, emphatically a philosophical dramatic poem, and the best of Goethe's productions in a department for which he seems to have been born. Much light is thrown on Goethe's life and character by the published correspondence with his contemporaries, Herder, Frau von Stein, Lavater, Jacobi, Merck, Countess Stolberg, &c.; by Eckermann's Conversations, and especially by his own Autobiography, which he himself describes as 'poetry and truth,' and in which probably the truth is sometimes clouded by the poetry. George Henry Lewes's Life of Goethe is a standard work both in Germany and Britain.

Gog and Magog. Ezekiel predicts the destruction of Gog and Magog (ch. xxxviii. and xxxix.) by the Jews, and mention is also made of them in Revelation (ch. xx.). Interpreters generally understand them to be symbolical expressions for the heathen nations of Asia. Magog is mentioned as the second son of Japheth in Genesis (ch. x. 2). Gog and Magog are also the names given to two reputed giants of early British history, whose statues are erected in the Guildhall in London. These statues are supposed to have been originally made for carrying about in pageants. The present figures of Gog and Magog, which are 14 ft. high, were erected in 1708.

Gogo, town in Bombay Presidency, on the peninsula of Kathiawar, on the Gulf of Cambay, 193 miles N.W. of Bombay. Pop. 7063.

Gogol, NIKOLAI VASSILJEVICH, Russian author, born in the province of Poltava 1809, died 1852. He went to St. Petersburg in 1829 and tried the stage, but failing, found his true vocation in literature. His works are extremely popular in Russia for their graphic and humorous delineation of everyday life and manners, and more especially Russian country life. Among his most notable works are—Evenings at the Farm (1832); Mirgorod, a collection of Tales (1834); the Dead Souls (1842), a satirical novel, depicting the public abuses and barbarism of manners prevalent in the provinces; and Revisor, a comedy. His later years were tinged with religious mysticism, and he wrote some curious Confessions.

Gogra, the chief river of Oudh, forming an important water-way for that quarter of India. It is a tributary of the Ganges; length, 600 miles.

Goitre (goi'tėr), or BRONCHOCELE (bron'-ko-sēl), known also in Great Britain as 'Derbyshire neck,' a disease endemic in Derbyshire, Switzerland, some parts of France and South America, and in many other parts of the world, chiefly in valleys and elevated plains in mountainous districts. It is a morbid enlargement of the thyroid gland, forming a soft and more or less mobile tumour or swelling, without any sign of inflammation, on the anterior part of the neck. It sometimes grows to such a size as to hang down over the breast, and respiration and swallowing may be impeded by it, though often it causes little inconvenience. It is regarded as the result of a combination of causes, among which malarial influences probably concur with those of the drinking water in developing the disease.



A female affected with Goitre.

Gokcha, GOKTSCHA, a lake in Russian Armenia, occupying a triangular cavity 540 sq. miles in extent, at an elevation of 6400 ft. above the sea. It receives the water of several streams without having any considerable outlet.

Golçon'da, a fortress and ruined city of India in the Nizam's dominions, 7 miles W. of Hyderabad. The fort is now used as the Nizam's treasury, and also as a state prison. In former times Golconda was a large and powerful kingdom of the Deccan, but was

subdued by Aurengzebe in 1687, and annexed to the dominions of the Delhi empire. It used to be famous for diamonds.

Gold is a precious metal of a bright yellow colour, and the most ductile and malleable of all the metals; symbol Au (Lat. *aurum*); atomic weight, 196. It is one of the heaviest of the metals, and not being liable to be injured by exposure to the air, is well fitted for coin and jewelry. Its ductility and malleability are very remarkable. It may be beaten into leaves so exceedingly thin that 1 grain in weight will cover 56 square inches, such leaves having the thickness of only $\frac{1}{282000}$th part of an inch. It is also extremely ductile; a single grain may be drawn into a wire 500 feet long, and an ounce of gold covering a silver wire is capable of being extended upwards of 1300 miles. It may also be melted and remelted with scarcely any diminution of its quantity. It is soluble in nitro-muriatic acid or *aqua regia*, and in a solution of chlorine. Its specific gravity is 19·3, or it is about nineteen times heavier than water. The fineness of gold is estimated by carats, pure gold being 24 carats fine. (See *Carat*.) Jeweller's gold is usually a mixture of gold and copper in the proportions of three-fourths of pure gold with one-fourth of copper. Gold is seldom used for any purpose in a state of perfect purity on account of its softness, but is combined with some other metal to render it harder. Standard gold, or the alloy used for the gold coinage of Britain, consists of twenty-two parts of gold and two of copper (being thus 22 carats fine). Articles of jewelry in gold are made of every degree of fineness up to 18 carats, *i.e.* 18 parts of gold to 6 of alloy. The alloy of gold and silver is found already formed in nature, and is that most generally known. It is distinguishable from that of copper by possessing a paler yellow than pure gold, while the copper alloy has a colour bordering upon reddish yellow. Palladium, rhodium and tellurium are also met with as alloys of gold.

Gold has been found in smaller or larger quantities in nearly all parts of the world. It is commonly found in reefs or veins among quartz, and in alluvial deposits. It is separated, in the former case, by quarrying, crushing, washing, and treatment with mercury. The rock is crushed by machinery, and then treated with mercury, which dissolves the gold, forming a liquid amalgam; after which the mercury is volatilized, and the gold left behind. Other processes are also in use. In alluvial deposits it is extracted by washing, in dust, grains, laminæ, or nuggets. Previous to the use of water, crushing may have to be employed. In modern times large supplies of gold were obtained after the discovery of America from Peru, Bolivia, and other parts of the New World. A chief source of the supply has long been the Ural Mountains, whence gold is still obtained. An immense increase in the world's production was caused by the discovery of gold in California in 1848, and that of the gold-fields of Australia in 1851. Gold-mines have also been extensively worked in New Zealand, and considerable quantities of the precious metal have been obtained in British Columbia, and elsewhere in Canada. In the United States, apart from California, gold in considerable quantities is found in several states and territories (especially Colorado). The production of both Australia and America has latterly much decreased, but on the other hand a very rich source of supply has been discovered in South Africa (the Transvaal). It is only since 1886 that the Transvaal has risen into importance as a gold-producing country, the chief locality where the metal is mined being the Witwatersrand. There are also gold-mines in India that are worked with great success. In Western Australia also many mines have recently been opened (Coolgardie being the chief centre), and the Yukon district of Canada (Klondike) is now a recognized gold-field. British Guiana also begins to promise well as a gold-yielding country. Gold has been found in various parts of the United Kingdom, as in Sutherlandshire, the Wicklow hills, and many places in Wales. The total value of the gold produced throughout the world, from 1493 to 1850, is estimated at £662,900,000; and from 1851 to 1885, at £890,500,000. In 1887 the world's production was estimated at £22,000,000; in 1898 at about £60,000,000, of which over £16,000,000 was from S. Africa. Enormous quantities of gold are consumed in the arts and are lost by wear of coin and jewelry.

Goldau (gold'ou), a valley in Switzerland, in the canton of Schwyz, between the Rigi and the Rossberg. It was the scene of a tremendous landslip (2nd Sept. 1806) by which a portion of the Rossberg, about 3 miles long, 1000 feet broad, and 100 feet thick, fell in one mass into the valley, burying several villages and killing upwards of 450 persons.

Gold-beater's Skin, a thin material prepared from the large intestine of the ox, used by gold-beaters and sometimes in surgery.

Gold-beating, the art or process of producing the extremely thin leaves of gold used in gilding, &c. The gold is cast into ingots weighing about 2 oz. each, and measuring about ¾ of an inch broad. These ingots are passed between steel rollers till they form long ribbons of such thinness that a square inch will weigh 6½ grains. Each one of these is now cut into 150 pieces, each of which is beaten on an anvil till it is about an inch square. These 150 plates are interlaid with pieces of fine vellum about 4 inches square, and beaten till the gold is extended nearly to the size of the vellum leaves. Each leaf is then divided into four, interlaid with gold-beater's skin, and beaten out to the dimensions of the skin. Another similar division and beating finishes the operation, after which the leaves are placed in paper books ready for use.

Goldberg, a town in Prussia, province of Silesia, 14 miles south-west of Liegnitz. The place owes its origin and name to a gold mine in the neighbourhood, abandoned since the 15th century. Pop. 6734.

Gold Coast, a British crown-colony in W. Africa, comprising that part of the Guinea coast which extends from 3° 30′ W. to 1° 30′ E. lon., stretching inland to an average distance of 50 miles. Estimated area, 15,000 sq. miles. The climate is unhealthy. The first settlements on the Gold Coast were made by the Portuguese, who built the fort of Elmina, which was seized by the Dutch in 1637. Subsequently there were a number of Dutch and English settlements established, but the former were transferred to Britain in 1872. Accra is the towns and settlements are Accra, Addah, Cape Coast Castle, Elmina, Quetta, Axim, and Annamaboe. The chief products are gold, palm-oil, ivory, copal, caoutchouc, &c. Imports for 1894, £688,467; exports, £850,343. Pop. 1,406,450.

Golden Age, that early mythological period in the history of almost all races, fabled to have been one of primeval innocence and enjoyment, in which the earth was common property, and brought forth spontaneously all things necessary for happy existence, while beasts of prey lived at peace with other animals. The Romans referred this time to the reign of Saturn. The so-called 'golden age' of Roman literature is reckoned from the time of Livius Andronicus, 250 B.C., to the death of Augustus Cæsar, A.D. 14.

Golden-beetle, the popular name of several tetramerous beetles of the genus *Chrysomĕla*. There are some British species, but most are tropical. Their most obvious characteristic is the great brilliancy of their colour. There are none of large size.

Golden Bull, an important document in the history of Germany issued by the emperor Charles IV. in 1356. Its immediate object was to regulate for all time coming the mode of procedure in the election and coronation of the emperors.

Golden-crested Wren, GOLDEN-CRESTED REGULUS, or KINGLET (*Regŭlus cristātus*), a beautiful bird belonging to the family Sylviadæ, distinguished by an orange crest. It is the smallest of British birds, being only about 3½ inches in length, is very agile, and almost continually in motion. The upper part of the body is yellowish olive green, all the under parts pale reddish white, tinged with green. The most usual haunts of the golden-crested wren are tall trees, particularly the oak, the yew, and the various species of pine and fir. Its nest is most commonly open at the top, but sometimes it is covered with a dome, and has an opening on one side. It is always ingeniously suspended beneath the branch, being the only instance of the kind amongst the birds of Great Britain. The eggs are nine or ten in number.

Golden Eagle. See *Eagle*.

Golden-eye, *Clangŭla vulgāris*, a species of wild duck. See *Garrot*.

Golden Fleece, in classical myth, the fleece of gold in quest of which Jason undertook the Argonautic expedition to Colchis. The fleece was suspended in an oak-tree in the grove of Ares (Mars), and was guarded by a dragon. When the Argonauts came to Colchis for the fleece, Medea put the dragon to sleep and Jason carried the fleece away. See *Argonauts*, *Jason*, *Medea*.

Golden Fleece, ORDER OF THE, the *Toison d'or*, a military order instituted by Philip the Good, Duke of Burgundy, in 1429, on the occasion of his marriage with the Portuguese princess, Isabella. The order now belongs to both Austria and Spain. The knights carry suspended from their collars the figure of a sheep or fleece in gold.

Golden Horde, originally the name of a powerful Mongol tribe, but afterwards extended to all the followers of Genghis Khan,

and of Batu, the grandson of Genghis Khan, who invaded Europe in the thirteenth century. Under Batu the Golden Horde advanced westwards as far as the plain of Mosi in Hungary, and Liegnitz in Silesia, at both of which bloody battles were fought in 1241. They founded the empire of the Kiptshaks, or the Golden Horde, which extended from the banks of the Dniester to the Ural, and from the Black Sea and the Caspian to the mouth of the Kama and the sources of the Khoper. This empire lasted till towards the close of the fifteenth century, when it was overthrown by Ivan III.

Golden Horn, the harbour of Constantinople, an inlet of the Bosphorus, so called from its shape and beauty.

Golden Legend (*Aurea Legenda*), a collection of legends of the Saints made in the 13th century by Jacobus de Voragine, archbishop of Genoa (died 1298). It consists of 177 sections, each of which is devoted to a particular saint or festival, arranged in the order of the calendar. Caxton printed a translation in 1483, and another edition was produced by Wynkyn de Worde in 1498.

Golden Number, in chron. a number showing the year of the moon's cycle; so called from having formerly been written in the calendar in gold. To find the golden number add 1 to the given year, and divide the sum by 19, what remains will be the number required, unless 0 remain, for then 19 is the golden number.

Golden-pheasant. See *Pheasant*.

Golden-rod (*Solidāgo*) is a genus of plants, natural order Compositæ, chiefly natives of North America. Most of the species have erect, rod-like, scarcely-branched stems, with alternate serrated leaves, and terminal spikes or racemes of small yellow flowers. *S. virgaurea*, often called Aaron's Rod, is the only British species, and is common in woods and heathy thickets.

Golden Rose, in the Roman Catholic church an ornament of gold consecrated by the pope on the fourth Sunday of Lent. It was originally a single flower of wrought gold, coloured red; afterwards the golden petals were decked with rubies and other gems; finally the form adopted was that of a thorny branch, with several flowers and leaves, and one principal flower at the top, all of pure gold. It is sent to some favoured prince, some eminent church, or distinguished personage.

Golden-saxifrage, the popular name for plants of the genus *Chrysosplenium*, a small genus of Saxifragaceæ, consisting of annual or perennial rather succulent herbs, with alternate or opposite crenate leaves, and inconspicuous greenish axillary and terminal flowers. They are natives of Central and Northern Europe, the Himalayas, and parts of America. There are two British species.

Goldfinch, a common British bird, the *Fringilla carduēlis*, belonging to the Finch family. It is about five inches in entire length, black, scarlet, yellow and white being beautifully mingled in its plumage. The colours of the female are duller than those of the male. Its brilliant plumage, soft and pleasant song, and docility make it a favourite cage-bird. Gold-finches feed on various kinds of seeds, particularly those of the thistle, dandelion, and groundsel.

Goldfish, the trivial name of a beautiful species of carp, found in the fresh waters of China. It is greenish in colour in the natural state, the golden yellow colour being found only in domesticated specimens, and retained by artificial selection. These fishes are reared by the Chinese in small ponds, in basins, or porcelain vessels, and kept for ornament. By careful selection, many strange varieties and monstrosities have been propagated. They are now distributed over nearly all the civilized parts of the world, but in large ponds they readily revert to the colour of the original stock.

Gold Lace, a fabric woven of silken threads which are either themselves gilt or are covered with fine gilt silver wire. In the former the gold-leaf is fixed directly on the threads by means of gum. In the latter and finer kind the fine gilt silver wire is twisted compactly round the silk threads, which are then ready for being manufactured into lace.

Gold of Pleasure, the *Camelīna satīva*, a cruciferous annual, order Brassicaceæ, with stem-clasping leaves, and terminal racemes of yellow flowers which produce pear-shaped pods containing numerous small seeds. It is found in Britain in corn-fields, and is cultivated to a considerable extent on the continent of Europe for its seeds, which yield an oil used for burning, for dressing woollen goods, making soft soap, and in painting. The stems yield a fibre commonly used for making brooms.

Goldo'ni, Carlo, a celebrated Italian writer of comedies, born at Venice in 1707; died at Paris 1793. He early showed a taste for theatrical representations, and, when scarcely eight years of age, he ventured to sketch a comedy, which excited the wonder of his

relatives. His father, who was a physician, intended that his son should follow the medical profession. But Goldoni, dissatisfied with this study, obtained permission to study law in Venice. Soon after, however, a relative procured for him a place in the Papal college at the University of Pavia, from which he was expelled for writing scurrilous satires. After his father's death he settled as an advocate in Venice, but shortly took to a wandering life with strolling players, until in 1736 he married the daughter of a notary and settled down in Venice. Here he first began to cultivate that department of dramatic poetry in which he was to excel; namely description of character and manners. In this he took Molière, whom he began to study about this time, for his model. For five years he visited various cities of Italy, composing pieces for different theatrical companies, and for a time renewing his legal practice. In 1761 the Italian players invited him to Paris, where many of his pieces met with uncommon applause. He became reader and master of the Italian language to the daughters of Louis XV.; and received latterly a pension of 3600 livres. At the breaking out of the revolution the poet lost his pension, and the decree of the national convention of the 7th of January, 1793, restoring it and making up the arrears, found him already in the arms of death. His widow received the arrears and a pension for herself. Many of his numerous pieces still retain possession of the stage in his native country, and, in translations, of the stages of foreign countries.

Goldschmidt, Madame. See *Lind, Jenny*.

Goldschmidt (golt'shmit), Meier Aaron, Danish novelist, born of Jewish parents 1819, died 1887. In 1840 he founded what became the most famons of Danish newspapers, The Corsair, celebrated for its brilliant wit and audacious satire. In 1845 he published his first novel, A Jew, which was translated into English and several other European languages. In 1847 he published a collection of short stories, and began the issue of another newspaper, North and South. His chief novels are Homeless, The Heir, The Raven, and The Vacillator. He also published a series of short stories of Jewish life, and a play, The Rabbi and the Knight. His style is said to be the most graceful in the language.

Goldsmith, Oliver, poet and miscellaneous writer, born Nov. 10, 1728, at Pallas, county Longford, Ireland, died in London April 4, 1774. His father, a clergyman of the Established Church, held the living of Kilkenny West. In 1745 he was entered as a sizar at Trinity College, Dublin. In 1749, shortly after his father's death, he quitted Dublin with the degree of Bachelor, and was advised by an uncle, who had already borne a large part of the expenses of his education, to prepare for holy orders. Rejected for holy orders he became tutor in a family, but soon



Oliver Goldsmith, from the statue by Foley.

lost his situation on account of a dispute with the master of the house over a game at cards. The same uncle who had given him assistance before now gave him £50 to go to Dublin to study law, but he had scarcely arrived at the city when he lost the whole sum in gambling. In spite of his repeated imprudences he was once more succoured by his uncle, who supplied him with means to go to Edinburgh to study medicine. Here he remained eighteen months, during which he acquired some slight knowledge of chemistry and natural history. At the end of this period he removed to Leyden, again at the expense of his uncle; and afterwards wandered over a large part of France, Germany, Switzerland, and Italy. It was probably at Padua that he took a medical degree, as he remained there six months; but his uncle dying while he was in Italy he was obliged to travel on foot to England, and reached London in 1756 with a few pence in his pocket. After some years of hard experience as a chemist's assistant, medical practitioner, proof-reader, and school usher, he drifted into literature. He conducted a department in the Monthly Review, wrote essays in the Public Ledger (afterwards

published under the title of the Citizen of the World), and a weekly pamphlet, entitled the Bee. In 1761 he was introduced to Dr. Johnson. In 1764 he appeared as a poet by the publication of his Traveller. In 1766 appeared his Vicar of Wakefield, which at once secured merited applause. In 1768 his comedy of the Good-natured Man was acted at Covent-Garden with but indifferent success. His poetical fame was greatly enhanced by the publication of his Deserted Village in 1770. In 1773 he produced his comedy of She Stoops to Conquer, which was completely successful. He also compiled histories of England, Greece, and Rome; and a History of the Earth and Animated Nature, a pleasing work, but one of no scientific value. His last days were embittered by the pressure of debt, incurred partly by his improvidence and partly by his generosity. The manners of Goldsmith were eccentric, even to absurdity. As a poet, his Traveller and Deserted Village have given him a deserved reputation; and his Vicar of Wakefield is one of the best known and most delightful of English novels.

Gold Wire, an ingot of silver superficially covered with gold, and drawn through a great number of holes of different sizes until it is brought to the requisite fineness.

Golf, a game played with clubs and balls, generally over large commons, downs, or links, where a series of small round holes are cut in the turf at distances of from 100 to 500 yards from each other, according to the nature of the ground, so as to form a circuit or round. The clubs are of different uses, and have different names according to the purpose for which they are respectively designed; as the *driver, putter, brassey, mashie, cleek, iron, niblick*, &c. The rival players are one on each side, or two against two, in which case the two partners strike the ball on their side alternately. The object of the game is, starting from the first hole, to drive the ball into the next hole with as few strokes as possible, and so on with all the holes in succession, the side which 'holes' its ball on any occasion with the fewest strokes being said to gain the hole. The match is usually decided by the greatest number of holes gained in one or more rounds, or the aggregate number of strokes taken to hole one or more rounds. In medal play the score is always reckoned by strokes. Golf, which was long almost entirely confined to Scotland, is now established in England and elsewhere.

Gol'gotha. See *Calvary*.

Goli'ath, a giant of Gath slain by David (1 Sam. xvii.). His height was "six cubits and a span," which, taking the cubit at 21 inches, would make him a little over 11 feet. The Septuagint and Josephus read, "*four* cubits and a span."

Goliath-beetle, the popular name of the beetles of the genus *Goliăthus*, natives of Africa and South America, remarkable for their large size, and on account of their beauty and rarity much prized by collectors. There are several species, as *G. cacicus* (goliath-beetle proper), *G. polyphēmus*, *G. micans*, &c. *G. cacicus*, a South American species, is roasted and eaten by the natives of the district it inhabits, who regard it as a great dainty. It attains a length of 4 inches.

Gollnow, a town in Prussia, 14 miles north-east of Stettin. Pop. 8426.

Golosh'es, a word introduced into our language from the French *galoche*, but originally derived from the Spanish *galocha*, meaning a wooden shoe or clog. It was formerly applied by the English to a kind of wooden clogs. The name is now restricted to overshoes, now generally made of vulcanized india-rubber.

Go'marites, Gomarists, followers of *Francis Gomar*, a Dutch disciple of Calvin in the 17th century. The sect, otherwise called Dutch Remonstrants, very strongly opposed the doctrines of Arminius, adhering rigidly to those of Calvin. See *Reformed Church*.

Gombroon', another name for *Bender Abbas*, which see.

Gome'ra, one of the Canary Islands, about 12 miles by 9 in extent; pop. 11,989. It has two towns, St. Sebastian and Villa Hermosa.

Gomez, Sebastiano, Spanish painter, born at Seville about 1616, died about 1690. He was originally a slave of Murillo, but on account of his genius he was liberated by his master and received among his pupils.

Gomor'rah. See *Sodom and Gomorrah*.

Gomul Pass, a pass across the Sulaimán range, from the Punjab into Afghanistan. It follows the course of the Gomul river, and is an important trading highway.

Gomu'ti Palm, the sago-palm (*Saguerus saccharifer*) which yields a bristly fibre resembling black horsehair known as gomuti. This fibre, which is also called *ejoo*, is manufactured into cordage, plaited into ornaments, employed for thatching, and put to various other similar uses. The sweet

juice yielded by the palm is fermented, forming the 'toddy' of the natives. In Malacca the gomuti is cultivated chiefly for its saccharine juice, which is crystallized into the sugar named jaggery. It is also one of the chief of the sago-producing palms.

Gonaives, a town on the west coast of Hayti, on the bay of the same name, 65 miles N.N.W. of Port au Prince. It has an excellent harbour. The exports are cotton, coffee, salt, and mahogany. Pop. 3000.

Gonda, chief town of district of the same name, Oudh, India, 28 miles N.N.W. of Fyzabád. Pop. 17,400. The district has an area of 2881 sq. miles. Pop. 1,459,229.

Gondar, a chief town of Abyssinia, formerly the residence of the king, and still the ecclesiastical head-quarters, is situated on a hill of considerable height, about 22 miles north of Lake Dembea. The town is divided into several quarters; contains many churches, and the ruins of a magnificent towered castle, built in the 16th century by Indian architects under the direction of Portuguese settlers. It was burned by King Theodore in 1868. Pop. 6000.

Gondoko'ro, formerly a trading and missionary station and military port on the Bahr el Abiad or White Nile, lat. 4° 55′ N.; for a time the chief seat of the Egyptian government of the Upper Nile, but now deserted.

Gon'dola, a sort of barge, curiously ornamented, and navigated on the canals of Venice. The middle-sized gondolas are upwards of 30 feet long and 4 broad; they



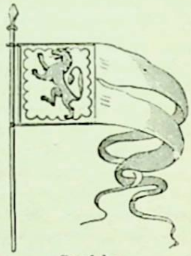
Gondola.

always terminate at each end in a very sharp point, which is raised perpendicularly to the height of a man. Towards the centre there is a curtained chamber for passengers.

Gonds, the aboriginal or rather non-Aryan inhabitants of the old territorial division of Hindustan called Gondwana, corresponding pretty nearly to what is now called the Central Provinces. After a long period of repression, they attained to a position of great prominence and power, and in the 16th, 17th, and 18th centuries three Gond dynasties simultaneously held almost the whole of Gondwana under their sway. With the rise of the Mahrattas the power of the Gonds declined, and in 1781 the last of their dynasties was overthrown and the independence of the Gonds ceased. Their numbers have been variously estimated up to 2,000,000, partly under feudatory states and partly under the British government, in the Central Provinces.

Gondwan'a, an extensive imperfectly defined tract of Central India. See *Gonds*.

Gon'falon, an ensign or standard; especially an ensign having two or three streamers or tails, fixed on a frame made to turn like a ship's vane, or, as in the case of the Papal gonfalon, suspended from a pole similarly to a sail from a mast. The person intrusted with the gonfalon in many of the mediæval republican cities of Italy was often the chief personage in the state.



Gonfalon.

Gong, a Chinese musical instrument made of an alloy of copper (about seventy-eight parts) and tin (about twenty-two parts), in form like a round flat dish with a rim 2 to 3 inches in depth. It is struck by a kind of drumstick, the head of which is covered with leather, and is used for the purposes of making loud sonorous signals, of marking time, and of adding to the clangour of martial instruments.

Gongo'ra y Argo'te, LUIS, a celebrated Spanish poet, was born at Cordova in 1561; died there in 1627. He was educated for the church, and was made chaplain to the king, and a prebendary in the cathedral of Cordova. His works consist chiefly of lyrical poems, in which he excelled. He introduced a new poetic phraseology called the *estilo culto*, and founded a school of writers, the *Gongoristas*, who carried this depraved style to an absurd length.

Gonid'ia, the name given to the secondary, reproductive, green, spherical cells in the thallus of lichens, forming the distinctive mark between those plants and fungi.

Goniom'eter, an instrument for measuring solid angles, particularly the angles formed by the faces of crystals. The *reflecting goniometer* is an instrument of this kind for measuring the angles of crystals by determining through what angular space the crystal must be turned so that two rays reflected from two surfaces successively shall have the same direction.

Gonorrhœa (gon-o-rē'a), a specific contagious inflammation of the male urethra or the female vagina, attended, from its early stages, with a profuse secretion of much mucus intermingled with matter. This secretion contains the contagion of the disease. Though termed a venereal disease, it is totally distinct from syphilis. It is a painful disease, and may result in the chronic catarrh called gleet, or may lead to stricture and other serious evils.

Gonsal'vo, HERNANDEZ Y AGUILAR, DE CORDOVA, Spanish soldier, called the *great captain* (*el gran capitan*), was born at Montilla, near Cordova, in 1453, died at Granada 1515. He distinguished himself in the Portuguese war which began in 1475, and in the great war with the Moors, which ended with the conquest of Granada in 1492. In 1495 he was sent to assist Ferdinand II., king of Naples, against the French, who occupied the whole of that kingdom. In less than a year Gonsalvo drove the French over the Neapolitan frontiers, and returned to Spain, where he was engaged in subjecting the Moors in the Alpujarras, when Louis XII. of France renewed the war against Naples. Gonsalvo again took the field, and by the victory near Seminara in 1502 obtained possession of both Calabrias. In 1503 he gained a still more important victory near Cerignola, in consequence of which Abruzzo and Apulia submitted, and Gonsalvo marched into Naples. He then sat down before Gaëta. As the siege was protracted, he gave up the command to Don Pedro Navarro, and advanced to meet the enemy. He defeated the Marquis of Mantua; and on the Garigliano, with 8000 men, obtained a complete victory over 30,000 French, the consequence of which was the fall of Gaëta. The possession of Naples was now secured. He was viceroy in Italy until 1507, when, through the jealousy of the king and the calumnies of the courtiers, he was deprived of his office, and retired to Granada, where he died.

Gonville and Caius (kēz) **College**, CAMBRIDGE, was founded in 1358 by Edmund Gonville, of Terrington, Norfolk. In 1558 Dr. Caius obtained the royal charter by which all the former foundations were confirmed and his own foundation was established. By this charter the college was thenceforth to be called Gonville and Caius College.

Gonzaga Family, a famous Italian family who ruled over Mantua for over three centuries. Many illustrious soldiers, statesmen, churchmen, and promoters and cultivators of arts, science, and literature sprang from this stock. They became extinct in 1708.

Good, JOHN MASON, English physician, author of various poems, translations, and professional treatises, was born 1764, died 1827. He was apprenticed to a surgeon at Gosport, and in 1784 engaged in practice at Sudbury. In 1793 he removed to London, where he carried on business for several years as a surgeon and apothecary. He obtained the diploma of M.D. from the University of Aberdeen in 1820, and from that period practised exclusively as a physician till his death. His best-known work is a blank verse translation of Lucretius' Latin poem De Natura Rerum.

Goodall, EDWARD, line-engraver, born at Leeds in 1795. He was self-taught, and early in his career attracted the notice of Turner, a number of whose pictures he engraved, including the large plates of Tivoli and Cologne, and various plates in the England and Wales and Southern Coast series. He also engraved many plates for the Annuals, and the largest number of the landscapes after Turner that illustrate the elegant editions of Rogers' Italy and Poems. He engraved a number of plates for the Art Journal, several from pictures by his son, Frederick Goodall, R.A., of which the Cranmer at the Traitors' Gate and the Happy Days of Charles I., both of large size, are the most important. He died in London in 1870.

Goodall, FREDERICK, R.A., English painter, son of Edward Goodall, the engraver; born in London 1822. At seventeen years of age he began to exhibit, and he has produced pictures very varied in subject and generally of high excellence. He was elected A.R.A. in 1853, and R.A. in 1863. Exemplifying variety, the following may be named: Raising the Maypole in the Olden Time (1851), Cranmer at the Traitors' Gate (1856), The Opium Bazaar, Cairo (1863), Mater Purissima and Mater Dolorosa (1868), The Subsiding of the Nile (1873), The Holy Mother and Child (1876), The Flight into

Egypt, and A New Light of the Harem (1884), Andromeda (1887), The Pets of the Harem (1889). Of late years his subjects have been mostly from Oriental life and scenery and from Holy Writ.

Good-conduct Pay, a pecuniary reward to corporals and privates in the British army for good conduct. The amount awarded at one time is a penny a day, with one white chevron on the arm as a badge of distinction. This reward is increased by one penny a day at certain periods of service till it reaches the maximum, sixpence. Good-conduct pay and badges are also awarded in the navy to seamen, but the grant is limited to threepence a day.

Good-Friday, a fast of the Christian Church in memory of our Saviour's crucifixion, kept on the Friday of Passion-week, that is the Friday before Easter. It has been celebrated from a very early period. In the R. Cath. Ch. the celebration of this fast includes prayers for all classes of people, including heretics, schismatics, pagans, and Jews, and the 'Adoration of the Cross,' but no mass is celebrated. In Protestant churches, with but a few exceptions, the day is observed with more or less solemnity. The practice of eating 'cross-buns' on this day has now no religious significance. In England and Ireland Good-Friday is a general holiday; in Scotland it is a bank holiday.

Good Hope, CAPE OF. See *Cape of Good Hope.*

Goodrich, SAMUEL GRISWOLD, American author, born at Ridgefield, Connecticut, 1793; died 1860. He was a publisher in Hartford and afterwards in Boston. He is best known as 'Peter Parley,' a pseudonym which he assumed in writing, editing, and compiling upwards of 100 children's books. In 1851 he acted as American consul at Paris, and published there in French a treatise on American Geography and History. He also wrote Recollections of a Lifetime; Sketches from a Student's Window; A History of all Nations; The Outcast and other Poems; and a general Natural History.—His brother, CHARLES AUGUSTUS (1790–1862), was associated with him on some of the books published by him, and also wrote a History of the United States, and other works.

Goods and Chattels, the legal and popular denomination for personal property as distinguished from things real, or lands, tenements, or hereditaments.

Good Templars, a temperance brotherhood which combines the principles of teetotalism with certain mystic rites, imitated less or more from freemasonry, having secret signs, passwords, and insignia peculiar to itself. It originated in New York in 1851, and extended to Britain in 1868. The organization consists of local 'subordinate' lodges, county 'district' lodges, national 'grand' lodges, and an international 'right worthy' grand lodge. A 'juvenile order' is also attached; and the Templars have founded an orphanage at Sunbury, near London, at a cost of £10,000.

Good-will, the benefit derived from a business beyond the mere value of the capital, stock, funds, or property employed in it, in consequence of the general public patronage and encouragement which it receives from constant and habitual customers. It is legally considered a subject of sale along with the stock, premises, fixtures, trade debts, &c.

Goodwin Sands, certain dangerous sandbanks, about 4 or 5 miles off the east coast of Kent, the intervening channel forming the well-known roadstead called the Downs. Their entire length, north to south, is about 10 miles; breadth, varying from 1½ mile to 3 miles; and in many places they are dry at low-water. This shoal has four lights for the guidance of mariners. According to tradition these sands formed at one time part of the Kentish land belonging to Earl Godwin, whence their name; and were submerged in the year 1037.

Goole, a town and river-port, England, county of York (West Riding), on the Ouse, 23 miles west by south of Hull. The town dates from 1829, when it became a bonding port, and it has a good shipping trade. Besides the tidal basin a series of large and commodious docks have been constructed. The exports are mostly coal, machinery, and woollen goods. Ship and boat building, sail-making, iron-founding, artificial manure and agricultural machine making, are carried on to some extent. Pop. (1891), 15,413.

Goorkhas, the mountaineers of Nepaul, Northern India, with whom a good understanding with the British exists. They now freely enter the native army, and are amongst the most faithful and courageous of the Indian troops, having particularly distinguished themselves in the battles on the Satlej in 1845–46, during the mutiny of 1857, in the war with Afghanistan in 1878–79, and in the short Egyptian campaign of 1882. They are Hindus in religion.

Goosander (*Mergus*), a genus of migratory natatorial birds, characterized by a beak thinner and more cylindrical than that of the ducks, and having each mandible armed at its margins with small pointed teeth, directed backward like a saw, the upper mandible being curved down at its extremity; there are about seven species. *M. Merganser*, the goosander or merganser proper weighs about 4 lbs. It is an Arctic bird, moving south in winter, and in severe seasons frequents the lakes and rivers of Britain. It feeds principally on fish, which it seizes by rapid diving. The *M. serrātor*, the red-breasted goosander, a frequent visitor to Britain, measures about 21 inches in length, and weighs about 2 lbs. The *M. cucullātus* is the hooded goosander peculiar to North America.

Goose, the common name of the birds belonging to the family Anseridæ or Anseres of earlier authors, a well-known family of natatorial birds. The domestic goose lives chiefly on land and feeds on grass; there are many varieties, but they do not differ widely from each other. It is valued for the table, and on account of its quills and fine soft feathers. The common wild goose, or grey-lag, which is migratory, is the *Anser ferus*, and is believed to be the original of the domestic goose. The Snow-goose (*A. hyperboreus*) of North America is 2 feet 8 inches in length, and its wings are 5 feet in extent. The bill of this bird is very curious, the edges having each twenty-three indentations or strong teeth on each side. The inside or concavity of the upper mandible has also seven rows of strong, projecting teeth, and the tongue, which is horny at the extremity, is armed on each side with thirteen long and sharp bony teeth. The flesh of this species is excellent. The *Laughing* or *White-fronted Goose* (*A. albifrons*) inhabits the northern parts of both continents, and migrates to the more temperate climates during the winter. The *bean-goose* (*A. segĕtum*) is also common to both continents. The *Canada-goose* (*A.* or *Cygnopsis Canadensis*) is the common wild goose of the United States, and is known in every part of North America. It is also found in Europe, and even breeds in Britain. Other species are the *bernicle goose* and the *brent-goose* (which see) the *dusky-goose* (*A. rufescens*, and the *pink-footed goose* (*A. brachyrhynchus*).

Gooseberry (*Ribes grossularia*), a low, branching shrub, growing wild in Siberia and the north of Europe, other species being found in N. America. Along with the currants it forms the order Grossulariaceæ, which is now usually combined with Saxifragaceæ. The branches are armed with numerous prickles, and bear three to five lobed leaves and inconspicuous flowers. The fruit is a succulent berry, very wholesome and agreeable, of various colours—whitish, yellow, green, and red. Gooseberries are popular fruits for preserving, and are extensively cultivated, being of very easy culture. They may be raised from slips, which is the usual mode of perpetuating varieties; new varieties are raised from seed. The plant of four years old produces the largest and finest fruit; afterwards the fruit becomes smaller but increases in quantity. *R. niveum*, an American species, has fine white flowers, and is cultivated as an ornamental shrub.

Goosefish, the Angler (which see).

Goosefoot (*Chenopodium*) is a genus of plants, natural order Chenopodiaceæ, indigenous to the temperate parts of the eastern continent. They are weedy plants common in waste places, and bear small greenish flowers, which are sessile in small clusters, collected in spiked panicles. Several species are found in Britain. *C. Bonus-Henrīcus*, English mercury, or good King Henry, is a substitute for spinage. The seeds of *C. quinoa* of Peru are used as food. See *Quinoa*.

Goosegrass. See *Cleavers*.

Gopher, the name of various burrowing animals, natives of N. America. The *Geomys bursarius* or pouched rat has large cheek-pouches extending from the mouth to the shoulders, incisors protruding beyond the lips, and broad, mole-like fore-feet. Several American burrowing squirrels also get this name, as *Spermophilus Franklinii*, *S. Richardsonii*, &c.; as also a species of burrowing land-tortoise of the Southern States, whose eggs are valued for the table.

Gopher-wood, the wood of which Noah's ark was built, but whether it was cypress, pine, or other wood is an unsettled point.

Göppingen (geup'ing-en), a town of Würtemberg, 22 miles E.S.E. Stuttgart. It is regularly built; contains a handsome church, town-house, old castle, and hospital; and has a mineral spring; manufactures of woollen and linen cloth, hats, paper, &c. Pop. 12,102.

Gorakhpur, a town of Hindustan, North-west Provinces, division of Benares, capital of the district of same name, on the left bank of the Rapti. It has a considerable trade in grain and timber, sent down the Rapti to

the Gogra and the Ganges. Pop. 63,620.—The district has an area of 4598 square miles. It is generally flat, and traversed by numerous streams, of which the principal are the Rapti and larger Gandak. Pop. 2,994,057.

Goramy, GOURAMI (gō-ra-mī', gö-ra-mī'), the Javanese name of a fish of the genus *Osphromĕnus* (*O. olfax*), family Anabasidæ or climbing perches, a native of China and the Eastern Archipelago, but introduced into the Mauritius, West India Islands, and Cayenne on account of the excellence of its flesh, where it has multiplied rapidly. It is deep in proportion to its length, and the dorsal and anal fins have numerous short spines, while the first ray of the ventral is protracted into a filament of extraordinary length. It is one of the few fishes which build nests, which it does by interweaving the stems and leaves of aquatic plants.

Gordiacea. See *Nematelmia.*

Gordian Knot. See *Gordius.*

Gordia'nus, M. ANTONIUS, the name of three Roman emperors, father, son, and grandson. The first was born in 158 A.D., and had governed Africa for many years, when he was proclaimed emperor at the age of eighty. He associated his son with him in the empire, but six weeks later the son was killed in fighting against the rival emperor Maximinus, and the father, in an agony of grief, died by his own hand. The grandson was proclaimed emperor by the soldiers in Rome 238 A.D., although he was not more than fifteen years of age. He reigned six years, when he was assassinated by his soldiers at the instigation of Philip, prefect of the Prætorian guard.

Gordius, in Greek legend, a Phrygian peasant, father of Midas, who was raised to the Phrygian throne in accordance with an oracle which declared to its Phrygian consulters that their seditions would cease if they elected as king the first man they met, mounted on a chariot, going to the temple of Zeus. This was Gordius, who, to evince his gratitude, consecrated his chariot to Zeus, and fastened the pole with so ingenious a knot that the oracle promised the dominion of the world to him who should untie it. Alexander the Great cut it with his sword, and to 'cut the Gordian knot' became a proverb.

Gordon, FAMILY OF, a celebrated Scottish historical house, the origin of which is still wrapped up in a certain measure of obscurity. It is probable that the family came over to England with William the Conqueror, and at a subsequent period settled in Berwickshire, where a parish and village bear this name. The adhesion of Sir Adam Gordon, Justiciar of Lothian, to the cause of Bruce gave him estates on Deeside and the Spey Valley. The direct male line died out in the person of Sir Adam of Gordon, who fell in the battle of Homildon (1402). But, from his female and illegitimate descendants, a number of branches sprang up. His grandson was made Earl of Huntly (1445). The head of this branch was made marquis in 1599, and Duke of Gordon in 1684. It became extinct in 1836. The title Marquis of Huntly passed to a branch of the family which acquired the title of Earl of Aboyne in 1660. The earls of Sutherland, the barons of Lochinvar, the viscounts of Kenmure, and the earls of Aberdeen are all branches of the Gordon family. The title Duke of Gordon was revived in 1875, and given to the Duke of Richmond and Lennox.

Gordon, CHARLES GEORGE, British soldier, known also as 'Chinese Gordon' and Gordon Pasha, was born at Woolwich 1833, killed at Khartoum 1885. He entered the Royal Engineers in 1852, and served in the Crimea (1854–56). During the Taeping rebellion in China Gordon succeeded in completely crushing the revolt by means of a specially-trained corps of Chinese, exhibiting marvellous feats of skilful soldiership. On his return to England with the rank of colonel he was appointed chief engineer officer at Gravesend, where his military talents and philanthropy were conspicuously displayed. From 1874 to 1879 he was governor of the Soudan under the Khedive. For a few months in 1882 he held an appointment at the Cape, and he had just accepted a mission to the Congo from the king of the Belgians, when he was sent to withdraw the garrisons shut up in the Soudan by the insurgent Mahdi. He was shut up in Khartoum by the rebels, and gallantly held that town for a whole year. A British expeditionary force under Lord Wolseley was despatched for his relief; an advance corps of which sighted Khartoum on 24th January, 1885, to find that the town had been treacherously betrayed into the hands of the Mahdi two days before, and Gordon murdered. Gordon's character was marked by strong religious feelings, which latterly became so intensified as to make him somewhat of a religious enthusiast and fatalist.

Gordon, Lord George, son of Cosmo George, duke of Gordon, born 1750, died 1793. He entered when young into the navy, but left the service during the American war. He then became a member of the House of Commons. His parliamentary conduct was marked by a certain degree of eccentricity, and by his opposition to the ministry. A bill having been introduced into the house for the relief of Roman Catholics from certain penalties and disabilities, in June, 1780, Lord George headed an excited mob of about 100,000 persons, who went in procession to the House of Commons to present a petition against the measure. The dreadful riot which ensued led to his arrest and trial on the charge of high treason; but, no evidence being adduced of treasonable design, he was acquitted. In the beginning of 1788, having been twice convicted of libelling the French ambassador, the queen of France, and the criminal justice of his country, he retired to Holland, but he was arrested, sent home, and committed to Newgate, where he passed the remainder of his life. He was undoubtedly crack-brained.

Gordon, Sir John Watson, Scottish painter, and president of the Royal Scottish Academy, was born in Edinburgh in 1790, died 1864. He applied himself almost exclusively to portrait-painting in which he attained great excellence. He was employed to paint the portraits of many of the most eminent Scotsmen of the day, among whom we may mention Sir Walter Scott, Dr. Chalmers, Professors Wilson, Ferrier, Munro, and Simpson, Principal Lee, Lord-president Boyle, the Duke of Buccleuch, Sir George Clark, De Quincey, George Combe, &c.

Gordon, Patrick, a Scottish soldier, born 1635, died at Moscow 1699. In 1661 he entered the Russian service, became a general, and rose high in favour with Peter the Great. He kept a diary for the last forty years of his life, part of which has been published.

Gore, Catharine Grace, English novelist, born 1799, died 1861. In 1823 she was married to Charles Arthur Gore of the 1st Life Guards, and shortly afterwards appeared her first novel, Theresa Marchmont, or the Maid of Honour. She wrote altogether from 60 to 70 novels, clever pictures of fashionable life, among the best of which are Preferment; the Courtier of the days of Charles II.; Cecil, or the Adventures of a Coxcomb; The Hamiltons; The Banker's Wife; Pin Money; Peers and Parvenues; and Temptation and Atonement. She was also the author of a tragedy, Lord Dacre of the South; and a successful comedy, A Quid pro Quo.

Goree', a small island, or rather rock, belonging to France, on the coast of Africa, a little more than a mile from the southern shore of the promontory that forms Cape Verd. The town of Goree contains about 2000 inhabitants, and is an entrepôt of French trade.

Gorget (French, *gorge*, throat), a piece of body armour, either scale work or plate, for the protection of the throat. The *camail,* or throat covering of chain mail, which is sometimes called the gorget of mail, belonged more to the helmet than to the body armour.



Plate Gorget

Gorgias (gor'ji-as), Greek orator and sophist, born at Leontini in Sicily about 480 B.C. When about sixty years of age he was sent ambassador to Athens where the rest of his life was mostly spent. He was a popular teacher of rhetoric, had many distinguished pupils, and Plato named one of his dialogues after him. He is said to have reached the extraordinary age of 107 or 108 years. Two works attributed to him are extant, The Apology of Palamedes, and the Encomium on Helena, but their genuineness has been questioned.

Gorgons, in Greek mythology, three frightful goddesses whose names were Stheno, Euryăle, and Medusa. They were all immortal, except Medusa. Their hair was said to be entwined with serpents, their hands were of brass, their body was covered with impenetrable scales, their brazen teeth were as long as the tusks of a wild boar, and they turned to stones all those who looked upon them. Medusa was killed by Perseus (which see), and her head was afterwards placed on the Ægis of Athena.

Gorgonzo'la, a town and commune, Italy, 12 miles E.N.E. of Milan. It has a fine modern church, and a trade in a kind of ewe-milk cheese. Pop. 3500.

Gorham, Rev. George Cornelius, a learned divine of the Church of England, born 1787, died 1857. He greatly distinguished himself at Cambridge University, was ordained in 1811, and after holding several curacies became vicar of St. Just in Penwith,

Cornwall, in 1846. Next year he was presented to the vicarage of Bramford Speke, near Exeter, but the bishop refused to institute him on the ground that his views on baptismal regeneration were not those of the Church of England (though similar Calvinistic views had been held by many Churchmen). The case was brought before the Court of Arches, which decided in favour of the bishop, and an appeal was then taken to the Privy Council, which reversed the judgment. Ultimately, after a long period of litigation and great excitement in the church ('the Gorham controversy'), Mr. Gorham was instituted into the vicarage in 1851. He was the author of various works.

Goril'la, *Troglodȳtes Gorilla*, the largest animal of the ape kind. It attains a height of about 5½ feet or more, is found chiefly in the woody equatorial regions of Western Africa, is possessed of great strength and fierceness, is a great frequenter of trees, and feeds chiefly on vegetable substances, as roots and fruits. The erect position is more readily assumed by the gorilla than by most of the other anthropoid apes, owing to the shape of the sole of the foot, which is not inverted, and is shorter and broader; but the ordinary gait is on all-fours. It has a ferocious and brutal cast of features, due to the prognathism of the jaws, the extremely prominent supra-orbital ridges, and retreating forehead. Gorillas make a sleeping-place somewhat like a hammock, connecting the branches of a tree by means of the long, tough, slender stems of climbing plants, and lining it with dried fronds of palms or long grass. This abode is constructed at different heights from the ground, but there is never more than one such nest in a tree. The gorilla, like the chimpanzee, has thirteen ribs, whereas man and the orang have twelve. The gorilla and chimpanzee also have eight bones in the carpus or wrist, while the others have nine. The bones of the arm are much longer than in man, and the upper arm is longer than the forearm; the leg bones are shorter than in man. In the proportion of its molar teeth to the incisors and in the form of its pelvis it approaches somewhat closely the human form. It is less intelligent and docile than several other apes. The Phœnician navigator Hanno found the name in use in the 5th century B.C. in W. Africa.

Gōritz. See *Görz*.

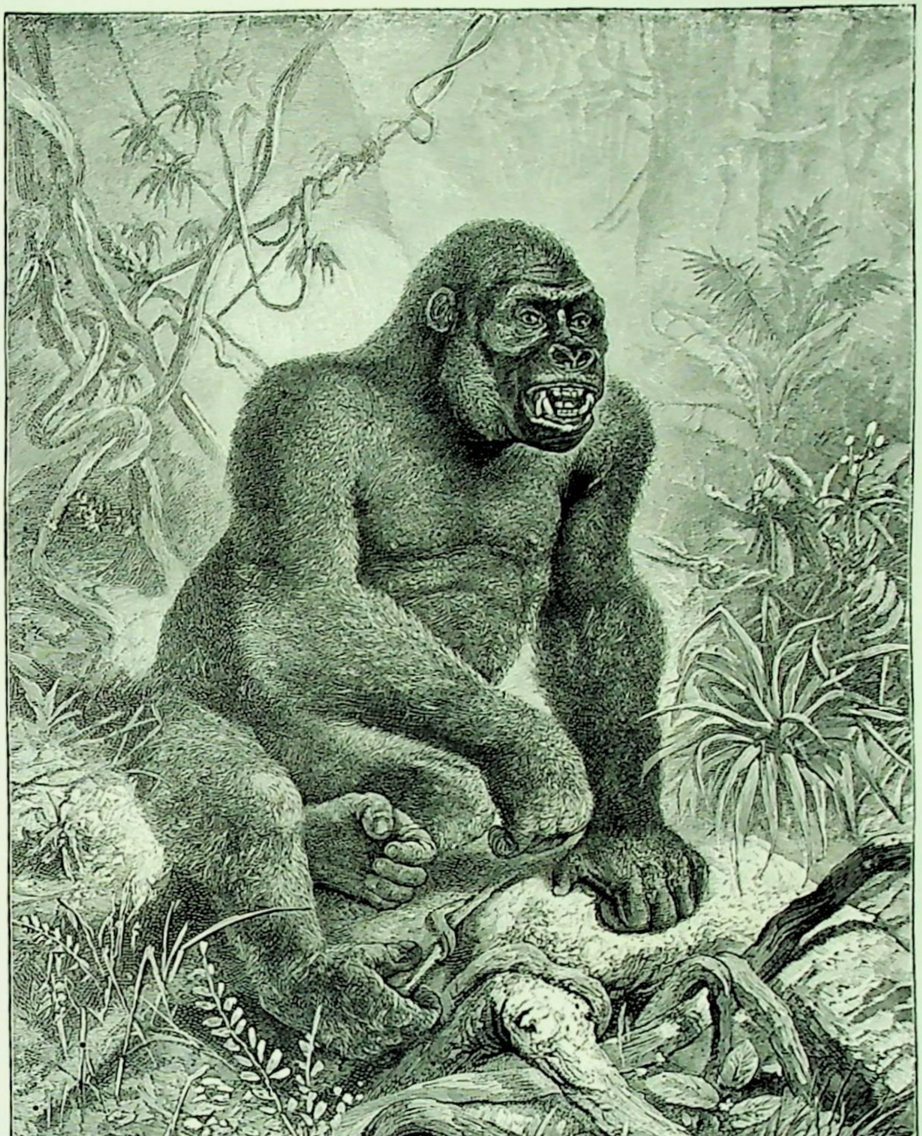
Gorkum (properly *Gorinchem*), a fortified town of the Netherlands, on the Linge, at its junction with the Merwede, the name given for a short distance to the river formed by the union of the Waal and the Maas, 22 miles E.S.E. of Rotterdam. Pop. 10,099.

Gōrlitz (geur'lits), a town in the Prussian government of Liegnitz, province of Silesia, on the left bank of the Neisse. It is well-built, having generally substantial houses, several large squares and spacious streets. Its industries include woollens, linens, and cottons, machinery, iron-founding, glass, porcelain, leather, soap, &c. The town was an important place for three centuries before the Reformation; it afterwards declined, but has rapidly increased in prosperity since the laying down of the railways; the population, which in 1831 was only 8000, was, in 1895, 70,172.

Gōrres (geur'res), JAKOB JOSEPH VON, a distinguished German publicist and author, born at Coblentz 1776, died at Munich 1848. He began life with very advanced ideas, but ultimately his republican views became much modified, and he ended as an uncompromising Ultramontane R. Catholic. He taught in a school at Coblentz, and having studied Persian, he produced a translation of part of the Shahnameh. In 1814 he started the Rheinische Merkur, the organ of the German national movement against Napoleon, but it was suppressed in 1816 as obnoxious to the Prussian government. He was latterly a professor at Munich. Among the chief works are Aphorisms on Art, Faith and Science, Mythological History of Asia, Christian Mysticism, &c.

Gortschakoff, PRINCE MICHAEL, Russian general, born in 1792, died 1861. He took part as an artillery officer in the battle of Borodino in 1812, and served in the subsequent campaigns of the allies against the French. He took a prominent part in the Turkish war (1828–29); the Polish war (1831); the invasion of Hungary (1849); and in the war with Turkey and the western powers (1853–55). In the Crimea he held the command in Sebastopol during the siege. After the war he was made governor of Poland.

Gortschakoff, ALEXANDER MICHAELOVITCH, Russian diplomatist, brother of the preceding, was born 1798, died 1883. He entered the diplomatic service in 1824 as secretary to the Russian embassy in London. His experience in diplomacy was extended in Vienna, Florence, Stuttgart, &c., and he showed considerable dexterity in securing the neutrality of Austria during the Cri-



THE GORILLA.

mean war. In 1856 he became minister of foreign affairs, and in 1862 chancellor of the empire. He was a prominent member of the Berlin Congress, 1878.

Goruckpore. See *Gorakhpur.*

Gory Dew, a name commonly given to one of the simplest forms of vegetation (*Palmella cruenta*), consisting only of a number of minute cells, which appears on the damp parts of some hard surfaces in the form of a reddish slime. It is an alga nearly allied to the plant to which the phenomenon of red snow is due.

Görz, GÖRITZ (geurts, geu'rits), a town of Austria, province of Görz and Gradisca, near the head of the Adriatic, 23 miles N.N.W. of Trieste. It occupies a very picturesque site on a mountain slope, and consists of the high town, surrounded by walls, and defended by an old castle; the new town, situated in the plain on the left bank of the river Isonzo; and several suburbs. Görz is the seat of an archbishop, and manufactures silk, cotton, leather, earthenware, &c. Charles X. of France died here in 1836. Pop. 20,433.

Goschen (gō'shen), GEORGE JOACHIM, politician and financier, of German extraction, born in London 1831, educated at Rugby and Oxford. He entered parliament in 1863. In 1865 he was sworn of the privy council on becoming a member of the Russell ministry. In 1868 he became president of the poor law board, and subsequently first lord of the Admiralty. On several occasions he found himself unable to move with the Liberal party; and when in 1886 Mr. Gladstone launched his Home Rule scheme for Ireland, Goschen became one of the leaders of the Liberal-Unionists. The same year he succeeded Lord R. Churchill as chancellor of the exchequer under Lord Salisbury, and in 1895 he again took office under the same leader as first lord of the admiralty. In 1900 he was raised to the peerage as Viscount Goschen. He is author of a well-known work on the Theory of Foreign Exchanges.

Goshawk, a raptorial bird of the hawk kind, belonging to the genus *Astur* (*A. palumbarius*). The general colour of the plumage is a deep brown, the breast and belly white. A full-grown female is 23 or 24 inches in length, the male a good deal smaller. It was formerly much used in falconry. This bird flies low, and pursues its prey in a line after it, or in the manner called 'raking' by falconers. The female was generally flown by falconers at rabbits, hares, &c., and the larger-winged game, while the male was usually flown at the smaller birds, and principally at partridges.

Goshen, in ancient geography, a district of Egypt, which Joseph procured for his father and brethren. It is supposed that the land of Goshen lay between the eastern part of the ancient Delta and the western border of Palestine.

Goslar, an interesting old town of Prussia in Hanover, 26 miles south-east of Hildesheim, on the north side of the Harz, at the foot of the Rammelsberg. It once ranked as a free imperial city, has remains of its old fortifications, and some old buildings, including part of a palace of the German emperors, dating from the 11th century. There is also a townhouse of the 15th century. The inhabitants are chiefly engaged in the copper, silver, and other mines in the neighbourhood. Pop. 11,736.

Gospel, GOSPELS. The Greek word for which *gospel* has been used as the equivalent is *evangelion*, or rather *euaggelion*, a good or joyful message. In the New Testament it denotes primarily the glad tidings respecting the Messiah and his kingdom—this was emphatically the *gospel* (Anglo-Saxon, *gód-spell*, good tidings). It was quite naturally employed as a common title for the historical accounts which record the facts that constitute the basis of Christianity. It may be fairly said that the genuineness of the four narratives written by Matthew, Mark, Luke, and John rests upon better evidence than that of any other ancient writings. They were all composed in the latter half of the first century; those of Matthew and Mark some years before the destruction of Jerusalem; that of Luke about the year 64; and that of St. John about the close of the century. Before the end of the 2d century we have abundant evidence that the four Gospels, as one collection, were generally used and accepted. While the early existence of these Gospels has been admitted, much discussion has taken place regarding their origin, and their relation one to another. They seem to have been viewed as so many original and independent sources, each one as much so as the others. The critical spirit of modern times has refused to halt at this point; it has sought to get at, so to speak, the genealogy of the several Gospels with their different degrees of relationship. Each of the four Gospels has in turn been assumed by different critics to be the first out of

which the others arose; and the theory has been more than once propounded of some prior, more strictly original document, no longer extant, which formed the common basis of them all. The supposition of an original document from which the three synoptical Gospels (those of Matthew, Mark, and Luke) were drawn, each with more or less modification, would naturally occur to those who rejected the notion that the evangelists copied from each other. The fourth Gospel, as the narrative coincides with that of the other three in a few passages only, is not drawn into the discussion, and the received explanation is the only satisfactory one with respect to it, namely, that John, writing last, had seen the other Gospels, and purposely abstained from writing anew what had been sufficiently recorded. Another conjecture is that the Gospels sprang out of a common oral tradition. According to this view of the origin of the Gospels, that of Mark, if not the oldest in composition, is yet probably the most direct and primitive in form; it is the testimony delivered by Peter, possibly with little alteration. The Gospels of Matthew and Luke, again, 'represent the two great types of recension to which it may be supposed that the simple narrative was subjected. Luke represents the Hellenic, and Matthew the later Hebraic form of the tradition, and in its present shape the latter seems to give the last authentic record of the primitive Gospel.' A comparison of the three synoptical Gospels yields some interesting results. If we suppose the history they contain to be divided into sections, in forty-two of these all the three narratives coincide; twelve more are given by Matthew and Mark only, five by Mark and Luke only, and fourteen by Matthew and Luke. To these must be added five peculiar to Matthew, two to Mark, and nine to Luke. But this applies only to general coincidence as to the facts narrated; the number of passages either verbally the same, or coinciding in the use of many of the same words, is much smaller. Briefly stated the critical result is as follows:—There is a singular coincidence in substance in the three synoptical Gospels. The verbal and material agreement is such as does not occur in any other authors who have written independently of one another. The agreement would be no difficulty without the differences; it would only mark the one divine source from which they were all derived. The difference of form and style, without the agreement, would offer no difficulty, since there may be a substantial harmony between accounts that differ greatly in mode of expression, and the very difference might be a guarantee of independence. Several biographies of Jesus and the holy family written by unknown authors of the 2d, 3d, and later centuries are known as *Apocryphal Gospels*. They have no historical nor doctrinal value whatever. The titles of the best known of these are: The Gospel of James, The Gospel of Joseph the Carpenter, The Gospel of Thomas, The Gospel of Nicodemus, The Acts of Pilate, and his Letter to Tiberias, &c.

Gosport, a town and fortified seaport, England, county of Hants, on the west side of the entrance to Portsmouth harbour, and directly opposite the town of Portsmouth. Besides containing infantry barracks, it is an important naval depôt, including a victualling yard, large government factories, and Haslar Hospital, the chief establishment in Britain for invalided sailors. Pop. 25,457.

Gos'samer is the name of a fine filmy substance, like cobweb, which is seen to float in the air in clear days in autumn, and is most observable in stubble-fields, and upon furze and other low bushes. This is formed by several kinds of small spiders, and only, according to some, when they are young.

Gosse, EDMUND WILLIAM, son of Philip Henry Gosse, born in London 1849; was appointed assistant in the British Museum 1867, translator to the Board of Trade 1875; has specially studied the northern literatures, and published Northern Studies, consisting of critical essays on Scandinavian, Dutch, and German literature. He has published several volumes of poetry and critical essays, and was Clark Lecturer in English literature at Trinity College, Cambridge, in 1884–89.

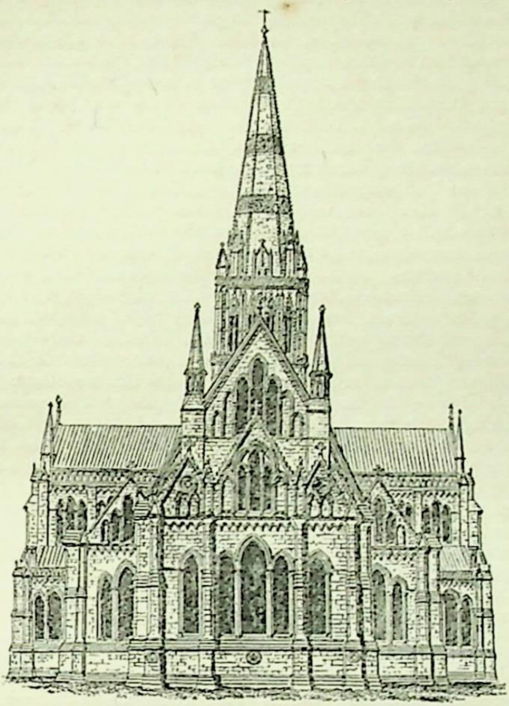
Gosse, PHILIP HENRY, F.R.S., naturalist, born at Worcester 1810, died 1888. From 1827 to 1835 he was resident in Newfoundland, and afterwards travelled through Canada and the United States, making all the time large collections of insects, &c. In 1844 he visited Jamaica. Among his many works are: The Canadian Naturalist, The Birds of Jamaica, A Naturalist's Sojourn in Jamaica, The Aquarium, Marine Zoology, Life, Actinologia Britannica, Romance of Natural History, &c., besides many contributions to the learned societies.

Göteborg, or GÖTHEBORG (*yeu'*te-borg). See *Gottenburg*.

Gotha (gō′tä), a town of Germany, capital of the Duchy of Saxe-Coburg-Gotha, on the Leine, 14 m. w.s.w. Erfurt, is well built, with fine environs and suburbs. The principal building is the ducal castle or palace, occupying the crown of the height on which the town is situated. It contains a museum, a picture-gallery, a valuable cabinet of engravings, a library of 200,000 vols. and 6000 MSS., of which 2500 are Arabic and 400 Persian and Turkish; and a collection of over 80,000 coins and medals. The manufactures consist chiefly of woollen, linen, and cotton tissues, porcelain, musical instruments, and articles in gold and silver. Pop. 27,802.

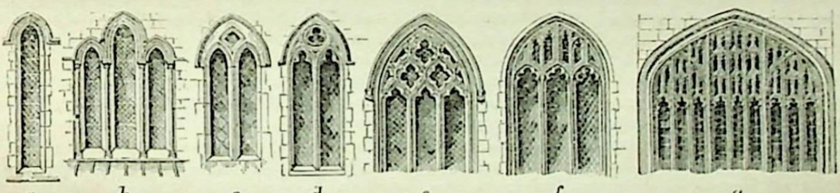
Gotha, Almanach de. See the article *Almanac.*

Gotham, a parish and village in county and 7 miles s.w. of Nottingham. It has an old reputation for folly, but the stories told of the 'wise men of Gotham' are widespread. Washington Irving applied the name to New York.



Gothic Architecture.—Salisbury Cathedral.

Gothard, St., a mountain group, Switzerland, on the confines of the cantons Tessin and Uri, belonging to the Lepontine or Helvetian Alps, which it connects with the Bernese Alps. It forms a kind of central nucleus in the great watershed of Europe. Its culminating point has a height of 10,600 feet. The Col of St. Gothard, at its summit level, where the Hospice stands, is 6808 feet high. Over it an excellent carriage road was completed in 1832. A railway tunnel has been pierced through this mountain group between Göschenen on the north and Airolo on the south, thus directly connecting the railway system of North Italy with those of Switzerland



Gothic Architecture.
ab, Early English Windows. *c*, Transition *d*, Geometrical. *e*, Perfect Decorated. *fg*, Perpendicular.

and Western and Central Germany. This tunnel is the longest in the world, being of the total length of 16,295 yds., or rather more than 9¼ miles. Its construction, begun in 1872, was completed in 1881, and it was opened for traffic early in 1882. Its total cost was about £2,400,000.

Gothic Architecture, a term applied to the various styles of pointed architecture prevalent in Western Europe from the

middle of the 12th century to the revival of classic architecture in the 16th. The term was originally applied in a depreciatory sense to all the styles which were introduced by the barbarians who overthrew the Roman Empire. But the invention or introduction of the pointed arch gave birth to a new style of architecture, to which the name Gothic is now properly restricted. The chief characteristics of Gothic architecture are:—The predominance of the pointed arch and the subserviency and subordination of all the other parts to this chief feature; the tendency through the whole composition to the predominance and prolongation of vertical lines; the absence of the column and entablature of classic architecture, of square edges and rectangular surfaces, and the substitution of clustered shafts, contrasted surfaces, and members multiplied in rich variety. This style originated in France and spread very rapidly to England, Germany, Italy, Spain, and the Scandinavian countries. In England it was introduced by William of Sens, who built Canterbury Cathedral in 1174, and here followed an independent course of development. The Gothic architecture of Britain has been divided into four principal epochs—the Early English, or general style of the 13th century; the Decorated, or style of the 14th century; the Perpendicular, practised during the 15th and early part of the 16th century (Flamboyant being the contemporary style in France); and the Tudor, or general style of the 16th century. From that time Gothic architecture declined in Britain, but a revival set in about 1825, and many fine specimens of Gothic have since been erected, chiefly ecclesiastical buildings. The several periods of Gothic architecture are clearly marked by the form and general treatment of the windows. Those of the Early English are of a simple lancet form of elongated proportions, or of two or more lancet forms combined by mouldings. Those of the Decorated are broader in proportion, and with the upper part highly enriched with tracery of various curves and combinations. Those of the Perpendicular are frequently of very large size and still broader in proportion, while the upper part is also highly enriched. The enrichments invariably consist of a series of forms in which vertical lines prevail. Between each of these styles there are transition periods in which the distinctions are less clearly marked. See also the separate terms.

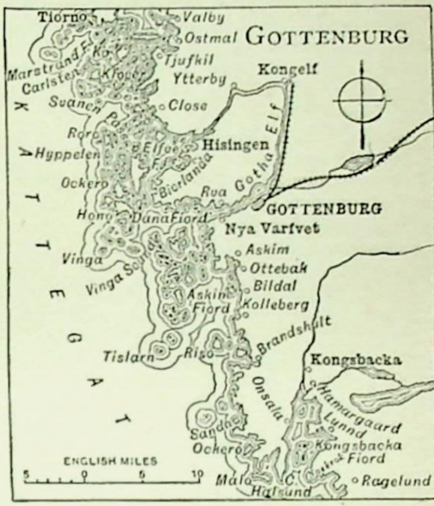
Gothland, or GOTTLAND (Swedish, *Götaland*), one of the large sections into which Sweden was originally divided, and including the portion south of lat. 59° 20′ N.

Goths, an ancient Teutonic tribe occupying when first known to history the region adjacent to the Black Sea north of the lower Danube. A people of similar name is mentioned by Tacitus as dwelling south of the Baltic, and *Geats* or *Gauts* are known to us from the Anglo-Saxon poem Beowulf as inhabitants of southern Sweden; but there is no necessary connection between these and the Goths proper. About the middle of the 3d century these began to encroach on the Roman Empire. Having seized the Roman province of Dacia, they were assailed by Decius, whom they twice defeated. In 253 they captured Trebizond, where a large fleet of ships fell into their hands. With this force they sailed down the Ægean and plundered the coasts of Greece and Illyria. They now began to threaten Italy, but in 269 they were defeated with great slaughter by the Emperor Claudius. His successor Aurelian was, notwithstanding, compelled to cede to them the large province of Dacia, after which there was comparative peace between them for many years. In the 4th century the great Gothic kingdom extended from the Don to the Theiss, and from the Black Sea to the Vistula and the Baltic. About the year 369 internal commotions produced the division of the Gothic kingdom into the kingdom of the Ostrogoths (eastern Goths) and the kingdom of the Visigoths (western Goths). In 396 Alaric, king of the Visigoths, made an irruption into Greece, laid waste the Peloponnesus, and became prefect of Illyria. He invaded Italy and sacked Rome in 409, and a second time in 410. After his death (in 410) the Visigoths succeeded in establishing a new kingdom in the southern parts of Gaul and Spain, of which, towards the end of the 5th century, Provence, Languedoc, and Catalonia were the principal provinces, and Toulouse the seat of government. The last king, Roderick, died in 711 in battle against the Moors, who had crossed from Africa, and subsequently conquered the Gothic kingdom. After the fall of the Western Roman Empire, by the invasion of Odoacer in 476, the Eastern emperor, Zeno, persuaded Theodoric, king of the Ostrogoths, to invade Italy in 489. The Goth became king of Italy in 493, and laid the foundation of

a new Ostrogothic kingdom, which, together with Italy, comprised Rhætia (a part of Switzerland and the Tyrol), Vindelicia (part of Bavaria and Swabia), Noricum (Saltzburg, Stiria, Carinthia, Austria), Dalmatia, Pannonia (Further Hungary, Slavonia), and Dacia beyond the Danube (Transylvania, Walachia). This kingdom came to an end in 554. Subsequently the Goths both here and in Spain entirely disappeared as a distinct people.

Christianity appears to have early taken root among the Goths settled in Moesia, a Gothic bishop being mentioned as present at the council of Nicæa (325). Their form of Christianity was Arianism, which was patronized by their protector Valens, and certainly adopted by their bishop, Ulfilas. The introduction of Christianity among the Goths, and the circumstance of their dwelling near, and even among civilized subjects of the Roman Empire, greatly contributed to raising them in civilization above the other German tribes. Bishop Ulfilas, in the 4th century, translated, if not the whole, at least the greater part of the Bible into Moeso-Gothic, using an alphabet which he formed out of those of the Greeks and Romans. Unfortunately only a small portion of this translation has come down to us; but this is quite sufficient to enable us to form an opinion of the language at that time, and is of the highest value from a philological point of view. Besides this translation there exist a few other monuments of the language, which are, however, of minor importance. Gothic was one of the Teutonic tongues, being accordingly a sister of Anglo Saxon and English, German, Dutch, Danish, &c. Being committed to writing earlier than any other Teutonic language, Gothic exhibits peculiarities entirely its own, and hence its value in the study of Teutonic philology in general. It is richer in inflections than any other of the Teutonic tongues. Swedish is the least like the Gothic of all the Germanic dialects, and notwithstanding the name *Gothland* (see above) there is no evidence to show that the Goths ever formed part of the population of Scandinavia. See *Ulfilas.*

Gottenburg, or GOTHENBURG (Swedish, *Göteborg*), a seaport town in Sweden, the second in respect of population and trade, capital of the län of the same name, situated at the mouth of the Göta, in the Kattegat, 255 miles W.S.W. Stockholm, intersected by canals. It is one of the best built towns in Sweden, and the seat of a bishopric. It has manufactures of sail-cloth, cotton, and other goods, and possesses ship-building yards, tobacco factories, breweries, sugar refineries, &c. The trade is very extensive, the harbour being excellent and always free from ice. It has a good depth of water, is defended by forts, and there is a dry dock cut in the solid rock. The completion of



the Göta canal and railway facilities have increased its importance. Among social reformers the town is noted for its licensing system, under which the public-house licenses are granted to a company, which, after paying the expenses of management with 6 p.c. annual interest on the shareholders' capital, makes over the profits to the town treasury. This plan has been in force since 1865. Pop. 111,234.

Gottfried von Strasburg. See *Godfrey of Strasburg.*

Göttingen (geut'ing-en), a town of Prussia, province of Hanover, on the Leine, 59 miles S.S.E. Hanover. It is a place of great antiquity, and is generally well built, having wide and spacious streets. Its chief attraction is the university, founded in 1734 by George II. of England and elector of Hanover, opened in 1737, and which has a European reputation. It has an average attendance of over 1000 students. Connected with the university are a museum, an observatory, an anatomical theatre, botanical garden, and a library possessed of

500,000 printed volumes and 5000 MSS. The manufactures comprise woollens, chemicals, scientific instruments, &c. Pop. 21,561.

Gottland, or GOTHLAND, an island of the Baltic, belonging to and 55 miles east of the coast of Sweden. It is of irregular shape, and has an area of 1200 sq. miles. The coast is for the most part rocky and deeply indented. The interior consists of a limestone plateau, intersected near its centre by a range of heights from 200 to 300 feet above the sea. The soil is fertile. The chief town, Wisby, was once a flourishing member of the Hanseatic League. Pop. 52,570.

Gottsched (got'shet), JOHANN CHRISTOPH, German writer, born 1700, died 1766. He became professor of eloquence and poetry, and afterwards of logic and metaphysics at Leipzig; and for many years was dictator in Germany in matters of literary taste. In 1728 he published the first sketch of his Rhetoric, and in 1729 his Kritische Dichtkunst (Critical Art of Poetry). Both these works condemn the disfigurement of the language by the use of foreign words, and oppose the taste for bombast in poetry which then prevailed. In 1730 he published his Contributions towards a Critical History of the German Language, Poetry, and Eloquence, and subsequently his Erste Gründe der Weltweisheit (First Principles of Philosophy). By advocating French taste in literature as opposed to English he lost within his lifetime much of the influence he had acquired earlier in his career.

Gouda (gou'dä), a town of Holland, in the province of South Holland, 11 miles north-east of Rotterdam, separated into two unequal parts by the Gouwe, which here unites with the Ijssel. The town is composed of neatly built houses, and is intersected by numerous canals. The great market-place is the largest in Holland. The church of St. John is noted for its organ and its painted glass windows, said to be among the finest in Europe. There are pipe-works, potteries, and breweries, and manufactories of stearine candles, yarn, and cigars. Gouda is a great market for cheese, sold under the name of Gouda cheese. Pop. 18,118.

Goudimel (gö-di-mel), CLAUDE, French musical composer, born 1510; killed during the St. Bartholomew massacres at Lyons, 1572. Palestrina was one of his pupils at Rome. His most important work is a setting of the French version of the Psalms by Marot and Beza. Some of these tunes are still used by the French Protestant Church and by the German Lutherans.

Gough (gof), HUGH, VISCOUNT, English general; born at Woodstown, co. Limerick, 1779; died 1869. He joined the army in 1794, and was present the year after at the capture of the Cape of Good Hope. He served in Spain 1809–13; was made major-general in 1830, and sent to India as commander of the Mysore division of the army in 1837. He commanded the land forces in the Chinese war of 1841; was made baronet, and returned to India as commander-in-chief; suppressed the revolt of the Mahrattas, 1843; and commanded in the Sikh wars of 1845–48. He was superseded by Sir Charles Napier in 1849. He was made baron in 1846; created viscount and pensioned, 1849; field-marshal, 1862.

Gough, JOHN BARTHOLOMEW, temperance orator, born at Sandhurst, Kent, 1817; died 1886. He attained a great celebrity as an orator in America, Britain, and the colonies, and published his autobiography, orations, and a volume of sketches, Sunlight and Shadow.

Goulburn (göl'bėrn), a city of N. S. Wales, in Argyle county, 134 miles s.w. of Sydney, well laid out, with broad streets lined with substantial buildings. Among the more important of the public buildings are the Anglican and Roman Catholic cathedrals, several other churches, the court-house, mechanics' institute, &c. The industries include jam-factories, flour-mills, breweries, tanneries, and boot and shoe factories. Being the centre of several important railways, it is the principal depot of the southern inland trade. There are no gold-fields in the vicinity, but silver, copper, and other metals, marble, slate, and lime, are among the yet undeveloped wealth of the quarter. Pop. 10,920.

Gould (gōld), JOHN, ornithologist, born at Lyme, Dorsetshire, 1804; died at London 1881. Originally a gardener, he was appointed curator to the Zoological Society's Museum in 1827, and henceforward his whole life was devoted to the study of birds. His chief works—all magnificently illustrated—are: A Century of Birds from the Himalayan Mountains, 1831; The Birds of Europe, 5 vols. folio, 1832–37; The Birds of Australia, 7 vols. folio, 1840–48, with 3 supplementary volumes, 1850–52; The Birds of Great Britain, 5 vols., 1862–73, &c.; besides a number of monographs on the humming-birds, the trogons, &c.

Gounod (gö-nō), CHARLES FRANÇOIS, French operatic composer, born at Paris 1817; studied at the Conservatoire under Halévy, Lesueur, and Pauer, and afterwards in Italy. His first important work was Faust (1859), which raised him to a high rank among composers. Other operas followed, among which are Mireille (1864), Romeo et Juliette, Cinq Mars (1877), and Polyeucte (1878). He wrote also a Messe Solennelle, a motet Gallia, and other choral works and songs; oratorios Redemption (1882), Mors et Vita (1885), and a Mass for the Jeanne D'Arc festival (1887). He died in 1893.

Goura (gou'ra), a genus of large-sized pigeons, natives of the Papuan Archipelago, comprising about six species known as crowned pigeons, and remarkable for their great size and the open erect crest with which the head is adorned. They pass most of the time on the ground, feed on fruits, and build their nests on the lower branches of trees. They have a stately bearing, harmoniously-coloured plumage, and are in high esteem for the table.

Gourami. See *Goramy.*

Gourd (görd), the popular name for the species of *Cucurbita*, a genus of plants of the nat. order Cucurbitaceæ. The same name is given to the different kinds of fruit produced by the various plants of this genus. These



Flower and Fruit of Squash (*Cucurbita Melopepo*).

are held in high estimation in hot countries; they attain a very large size, and most of them abound in wholesome, nutritious matter. The *C. Pepo*, or pumpkin, acquires sometimes a diameter of 2 feet. The *C. Melopepo*, or squash, is cultivated in America as an article of food. The *C. Citrullus*, or water melon, serves the Egyptians for meat, drink, and physic. The *C. aurantia*, or orange-fruited gourd, is cultivated only as a curiosity, and is a native of the East Indies. The *Lagenaria vulgāris*, or bottle gourd, a native both of the East and West Indies, is edible, and is often 6 feet long and 18 inches in circumference. The outer coat or rind serves for bottles and water-cups.

Gourd-tree. Same as *Calabash-tree.*

Gourock (gö'rok), a town of Renfrewshire, Scotland, on the Firth of Clyde, 2 miles west of Greenock. It is a favourite watering-place, yachting station, and has a pier for steamers. Pop. 4475.

Gout, a form of arthritis, a constitutional disorder giving rise to paroxysms of acute pain with a specific form of inflammation, appearing after puberty chiefly in the male sex, and returning after intervals. It is very often preceded by, or alternates with, disorder of the digestive or other internal organs, and is generally characterized by affection of the first joint of the great toe, by nocturnal exacerbations and morning remissions, and by vascular plethora; various joints, organs, or parts becoming affected after repeated attacks without passing into suppuration. It may be acquired or hereditary. In the former case it rarely appears before the age of thirty-five; in the latter, it is frequently observed earlier. It appears that the disease is due to an excess of uric acid in the blood, this either being formed in the body in too large quantity, or not being removed from the blood by the kidneys in the urine as it ought to be. Indolence, inactivity, and too free use of tartareous wines, fermented liquors, and very high-seasoned and nitrogenous food, are the principal causes which give rise to this disease. Gout is also called, according to the part it may affect, *Podagra* (in the feet), *Gonagra* (in the knees), *Chiragra* (in the hands), &c. It may be acute or chronic, and may give rise to concretions, which are chiefly composed of urate of soda. Strict regulation of the habits of life is one of the most important elements in the treatment of gout.

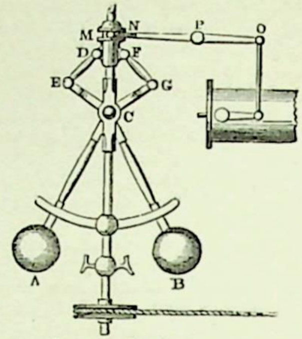
Gout-weed. See *Bishop-weed.*

Gov'an, a town of Scotland, county of Lanark, on the left bank of the Clyde, to the west of Glasgow, of which it forms a suburb. It is the site of extensive ship-building yards, engineering works, dye-works, &c. That part of Govan parish south of the Clyde, and beyond the boundaries of Glasgow, forms a parliamentary division of Lanarkshire, returning one member. Pop. of town, (1891), 63,625.

Government is a word used in common speech in various significations. It denotes

the act of governing, the persons who govern, and the mode or system according to which the sovereign powers of a nation, the legislative, executive, and judicial powers are vested and exercised. Aristotle classified the forms of government into three classes: 1st, Monarchy, or that form in which the sovereignty of the state is vested in one individual; 2d, Aristocracy, or that in which it is confided to a select portion of the community supposed to possess peculiar aptitude for its exercise; and 3d, Democracy, or that in which it is retained by the community itself, and exercised, either directly, as in the small republics of ancient Greece, or indirectly, by means of representative institutions, as in the constitutional states of modern times. Each of these forms if brought into existence by the general will of the community, maintained by its consent, and employed for its benefit, is said to be a legitimate government. But each of these legitimate forms was considered by the ancients to be liable to a particular form of corruption. Monarchy had a tendency to degenerate into tyranny, or a government for the special benefit of the single ruler; aristocracy became oligarchy; and democracy degenerated into ochlocracy or mob rule. Through each of these various forms, each legitimate form being followed by its corresponding perverted form, government was supposed to run in a perpetual cycle; the last form, ochlocracy, being followed by anarchy. As a means of avoiding these evils, a mixed government is supposed to have been devised. The best species of mixed government was believed by Aristotle to be a union of aristocracy and democracy. The most remarkable instance of this form is, however, supposed to be seen in that balance of powers which forms the essence of the British constitution. See *Aristocracy, Democracy, Monarchy, Oligarchy, Republic, Local Government*, &c.

Governor, a contrivance in mills and machinery for maintaining a uniform velocity with a varying resistance. A common form of steam-engine governor consists of a pair of balls (A B) suspended from a vertical shaft kept in motion by the engine. When the engine goes too fast the balls fly farther asunder, and depress the end of a lever (N P O), which partly shuts a throttle-valve, and diminishes the quantity of steam admitted into the cylinder; and on the other hand, when the engine goes too slow, the balls fall down towards the spindle and elevate the valve, thus increasing the quantity of steam admitted into the cylinder. By this ingenious contrivance, therefore, the quantity of steam admitted to the cylinder is exactly



Governor of a Steam-engine.

proportioned to the resistance of the engine, and the velocity kept constantly the same. A similar contrivance is employed in mills to equalize the motion of the machinery. When any part of the machinery is suddenly stopped, or suddenly set agoing, and the moving power remains the same, an alteration in the velocity of the mill will take place, and it will move faster or slower. The governor is used to remedy this.

Gower, John, an early English poet, a contemporary and friend of Chaucer, born about 1320, died 1408. He was liberally


John Gower.

educated, and was a member of the society of the Inner Temple. He appears to have been in affluent circumstances, as he contributed largely to the building of the conventual church of St. Mary Overy, in

Southwark. His chief works are his Speculum Meditantis, Vox Clamantis, and Confessio Amantis; of which the first was a moral tract relative to the conjugal duties, written in French rhymes (now lost); the second a metrical chronicle of the insurrection of the commons under Richard II., in Latin elegaic verse; and the third an English poem in eight books, containing 30,000 lines, relative to the morals and metaphysics of love, one of the earliest products of the English press, being printed by Caxton in 1483.

Gowrie Conspiracy, one of the strangest episodes in Scottish history, took place in August, 1601. King James VI. while hunting in Falkland Park, Fifeshire, was asked by Alexander Ruthven (brother of the Earl of Gowrie) to accompany him to Gowrie House, near Perth, on the pretext that they had caught a Jesuit with an urn of foreign golden pieces hid under his cloak. On arriving at Gowrie House an attempt was made on the life or liberty of the king, but an alarm being raised, both the Ruthvens were slain, and James with difficulty escaped, as the Gowries were very popular with the inhabitants of Perth.

Goya'na, a city of Brazil, in the state of Pernambuco, 40 miles N.W. of the port of Recife or Pernambuco. Commerce in cotton, sugar, rum, hides, timber, castor-oil, &c. Pop. 10,000.

Goyaz, an inland state of Brazil, area 288,462 sq. miles. Chief town, Goyaz. The chief occupation of the inhabitants is cattle rearing and agriculture. Gold was formerly plentiful, and diamonds and other precious stones have been found. Pop. 191,711. The chief town, formerly called Villa Boa, has a cathedral, government palace, &c. Pop. 8000.

Gozo, or Gozzo, an island of the Mediterranean, belonging to Britain, about 4 miles N.W. of Malta; length, 9 miles; breadth, 5 miles; area, about 27 sq. miles. A good deal of grain and fruit is raised; but the most important crop is cotton. Cattle of superior quality are reared. The chief town, Rabato, contains about 3000, and the whole island 18,680 inhabitants.

Gozzi (got'sē), CARLO, Italian dramatist, born at Venice 1722, died 1806. His principal work consists of a series of dramas based on fairy tales, which obtained much popularity, and were highly praised by Goethe, Schlegel, De Staël, Sismondi, &c.

Gozzoli (got'so-lē), BENNOZO, Italian painter, born at Florence 1424, died some time after 1496. He was a pupil of Fra Angelico, and wrought at Florence, Rome, Orvieto, and Pisa. His name is specially identified with the great series of mural paintings in the Campo Santo, at Pisa, consisting of 24 subjects from the Old Testament, from the Invention of Wine by Noah to the Visit of the Queen of Sheba to Solomon.

Graaff-Reinet (graf-ri'net), a town, Cape Colony, capital of a division of the same name, the oldest and largest town in the midland district of the colony. There are churches and schools of the English Episcopalian and the Dutch Reformed denominations, a public library, and a college. It is regularly laid out with streets at right angles, the intervening squares being filled up with vineyards and gardens. Pop. 5913.

Graafian Vesicles, in anatomy, numerous small globular transparent follicles found in the ovaries of mammals. Each follicle contains one ovum, which is expelled when it reaches maturity. Small at first, and deeply imbedded in the ovary, they gradually approach the surface, and finally burst and discharge the ovum.

Graal. See *Grail.*

Gracchus, a Roman family of the Sempronian gens, several members of which have become historical. TIBERIUS SEMPRONIUS GRACCHUS, a general of the Second Punic War, was consul 215 B.C., defeated Hanno 214 B.C., and was killed 212 B.C.—Another TIBERIUS SEMPRONIUS GRACCHUS became consul 178 B.C., and again 163 B.C. He married Cornelia, a daughter of Scipio Africanus, and was the father of the two most celebrated Gracchi, TIBERIUS SEMPRONIUS and CAIUS, the former born about 169 B.C., killed 133 B.C.; the latter born 159 B.C., killed 121 B.C. The brothers having lost their father early, received from their mother Cornelia a careful education. At a more advanced age their minds were formed and ennobled by the Greek philosophy. Tiberius early made himself conspicuous in the military service. Under the command of his brother-in-law, the younger Scipio, he served at the siege of Carthage. While he was yet a mere youth he was received into the College of Augurs—an honour usually conferred only upon distinguished statesmen. He was subsequently quæstor to the Consul Mancinus, and was employed in the Numantian war, in which he greatly distinguished himself by the conclusion of a treaty by which he saved the lives of 20,000 men

who were entirely at the mercy of the Numantines. This treaty was, however, repudiated by the Romans, but it increased his popularity immensely. In 133 B.C. he offered himself as a candidate for the tribuneship, which office rendered his person inviolable so long as he was invested with it, and placed him in a situation to advance his great plans for the improvement of the condition of the people in a legal way. His first efforts were directed to a reform of the Roman land system, by the restoration or enforcement of the old Licinian law, which enacted that no one should possess more than 500 acres of the public domains, and that the overplus should be equally divided among the plebeians. This law, which was now called, after Gracchus, the *Sempronian*, or, by way of eminence, the *agrarian law*, he revived, but with the introduction of several softening clauses. He was violently opposed by the aristocracy and the tribune Marcus Octavius, whose veto retarded the passage of the bill. Tiberius, however, by exerting all the prerogative of his office, managed to pass his bill, and three commissioners were appointed to carry it into execution, namely, Tiberius himself, his brother Caius, and his father-in-law Appius Claudius. Soon after this Attalus, king of Pergamus, died, bequeathing his treasures to the Roman people. Tiberius proposed that this bequest should be divided among the recipients of land under the new law, and to give the popular assembly instead of the senate the management of the state. But fortune turned against him; he was accused of having violated his office; of aspiring to be king; and at the next election for the tribuneship he was slain, with 300 of his followers, at the entrance to the Temple of Fides. Ten years after the death of his brother Tiberius, the younger Gracchus obtained the tribuneship. In the discharge of his office he first of all renewed his brother's law, and revenged his memory by expelling many of his most violent enemies from the city. Several popular measures gained him great favour with the people, but the intrigues of the nobles ultimately caused his fall. Livius Drusus, a tribune gained over to their interests, had the art to withdraw the affections of the populace from Caius by making greater promises to them, and thus obtained a superior popularity for himself and the senate. Hence it resulted that Caius did not obtain a third tribuneship, and Opimius, one of his bitterest enemies, was chosen to the consulate. A tumult, in which a lictor of Opimius was killed, gave the senate a pretence for empowering the consuls to take strong measures. Opimius made an attack upon the supporters of Gracchus with a band of disciplined soldiers. Nearly 3000 were slain, and Gracchus escaped to the grove of the Furies, where he was slain at his own request by a slave, who then killed himself.

Grace, in theology, the divine influence or the influence of the Holy Spirit in renewing the heart and restraining from sin; or, that supernatural gift to man whereby he is enabled to take to himself the salvation provided and offered through Christ (special or saving grace). Before the fifth century little attention was paid to the dogmatic question of grace and its effects. Pelagius, a native of Britain, having used some free expressions, which seemed to attribute too little to the assistance of divine grace in the renovation of the heart of man, and too much to his own ability to do good, Augustine undertook an accurate investigation of this doctrine. He came to the opinion, which has since been so much discussed, that God, of his own free-will, has foreordained some to eternal felicity and others to irrevocable and eternal misery. In accordance with this view of Augustine, is the doctrine of predestination. The majority of those who were considered Catholic or Orthodox coincided with Augustine, and, with him, pronounced the Pelagians heretics, for holding that human nature is still as pure as it was at its first creation, that all the corruption which prevails is the effect of the influence of bad example, and that, consequently, man being sufficient for his own purification, has no need, at least, of preventing grace. The Abbot Cassianus, of Marseilles, adopted a middle course, in order to reconcile the operations of grace and free-will in man's renovation, by a milder and more scriptural mode. He considered the predestination of God, in respect to man's salvation, as a conditional one, resting upon his own conduct. His followers were named *semi-* or *half-Pelagians*, though the Catholic Church did not immediately declare them heretics. Subsequently a gradual change of sides was exhibited. During the middle ages the scholastic theologians so perverted the doctrines of Augustine as to make them easily reconcilable with those of the Pelagians. But at the Reformation Calvin and Beza, and the great body of their followers, re-

turned to the fundamental principles of Augustine. In the meantime, however, the Catholics had not come to a final agreement concerning this dogma. This appears from the quarrels of the Dominicans and Jesuits, and from the case of the Jesuit Lewis Molina, in 1588, from whom the Molinistic disputes in the Netherlands received their name. In the seventeenth century, also, two new parties, which had their origin in the dispute concerning the doctrine of predestination, sprang up in the Netherlands, namely the Arminians or Remonstrants, among the Protestants, and the Jansenists among the Catholics. (See *Arminians*, *Jansenists*.) From that time the members of the Christian church have continued to differ upon this subject.

Grace, Days of, in commerce, a certain number of days immediately following the day, specified on the face of a bill or note, on which it becomes due. Till the expiry of these days payment is not necessary. In Britain and America the days of grace are three. Austria (three days) and Russia (ten days) are the only other countries which allow days of grace.

Graces (Greek, *Charites*, translated by the Romans *Gratiæ*), the goddesses of grace, from whom, according to Pindar, comes everything beautiful and agreeable. According to most poets and mythologists they were three in number, the daughters of Zeus and Eurynŏme, and Hesiod gives them the names of *Aglaia* (brilliancy), *Thalīa* (the blooming), and *Euphrosy̆nē* (mirth). Homer mentions them in the Iliad as handmaids of Hera (Juno), but in the Odyssey as those of Aphroditē (Venus), who is attended by them in the bath, &c. He conceived them as forming a numerous troop of goddesses, whose office it was to render happy the days of the immortals. The three graces are usually represented slightly draped or entirely nude, locked in each other's embrace, or hand in hand.

Gracio'sa, one of the Azores. Chief town, Santa Cruz. Pop. 8000.

Gra'dient, in roads and railways, a term used to signify the departure of the track from a perfect level, usually expressed as a fraction of the length: thus 1 in 250 signifies a rise or fall of 1 foot in 250 feet measured along the line.

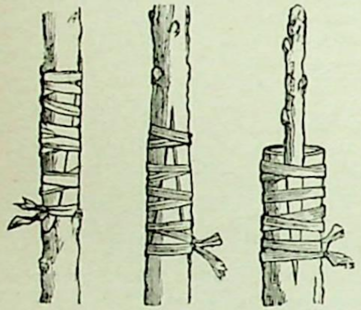
Grad'ual, the psalm, anthem, or hymn, said or sung in the service of the Roman Catholic Church between the Epistle and the Gospel; so named from being anciently chanted on the steps of the ambo or pulpit, or of the altar. By an easy transition the name was frequently applied to the Antiphonary, which was originally one of the three service books of the church, but afterwards in the 11th or 12th century included in the missal.

Graduation, the art of dividing into the necessary spaces the scales of mathematical, astronomical, and other philosophical instruments. Common graduation is simply effected by copying from a scale prepared by a higher process; original graduation is chiefly performed either by *stepping* or bisection. Stepping consists in ascertaining by repeated trial with finely-pointed spring-dividers—which are made, as it were, to proceed by successive steps—the size of the divisions required, their number being known, and then finally marking them. In bisection the beam compasses are used, an arc with a radius of nearly half the line being described from either end of the line, and the short distance between the arcs bisected with the aid of a magnifier and a fine pointer. The process is repeated, for each of the two halves thus obtained, until by subdivision the required graduation is obtained. Ordinary instruments are graduated by machines, most of which are based upon the principle of that invented by Ramsden in 1766. In this there is a horizontal wheel, turning on a vertical axis, with a toothed edge which is advanced a certain amount (*e.g.* 10′ of arc) by each revolution of the endless screw with which it gears. The screw is worked by a treadle, and the machine can be so adjusted that a movement of the treadle shall secure either the whole or any desired part of a revolution of the screw. A dividing engine was invented by Troughton, but it was exceedingly complicated. That of Simms, which was self-acting and threw itself out of gear when its work was done, takes a high place among mechanical inventions. The most accurate was that of Andrew Ross (1831). For fine graduation Froment invented a machine in which the object to be graduated was slowly and intermittingly pushed forward by a screw, while a fine steel or diamond point, working automatically, made a cut at each cessation of the feeding motion. He thus drew 25,000 lines marking equal intervals in the space of one inch, but the number has since been increased to 225,000 by Nobert. See *Nobert's Test Plates*.

Græcia Magna. See *Magna Græcia.*

Graffi'ti, the rude designs and inscriptions of popular origin drawn or engraved with a style upon the walls of ancient towns and buildings, particularly of Rome and Pompeii. Those in Pompeii are in Latin, Greek, and Oscan, showing that the ancient language of Campania was still extant among a portion of the populace. The inscriptions are mostly amatory or humorous, sometimes malicious or obscene. In Rome graffiti occur frequently in the catacombs. Many of these are by Christians, some by Pagans in ridicule of Christianity.

Grafting, an operation by which a bud or scion of an individual plant is inserted upon another individual, so as to become organically united with the stock on which it has been placed. Grafting can only take place between plants which have a certain affinity, individuals of the same species, genus, or order. The graft does not become identified



Splice-grafting. Saddle-grafting. Cleft-grafting.

with the stock to which it is united, but retains its own peculiarities of variety or species. The parts between which grafting is effected must be actively vegetating. The advantages derived from grafting are the preservation of remarkable varieties, which could not be reproduced from seed; the more rapid multiplication of particular species, and the anticipation of the period of fructification, which may thus be advanced by several years. The principal methods of grafting are—1. *By approach.*—This process is intended to unite at one or more points two plants growing from separate roots. Plates of bark of equal size are removed, the wounds are kept together and protected from air. Stems, branches, or roots may be united in this way. 2. *By scions.*—Under this head there are a variety of methods, such as *whip, splice, cleft, saddle, crown grafting*, &c. In *whip-grafting* or *tongue-grafting* the stock is cut obliquely across and a slit or very narrow angular incision is made in its centre downwards across the cut surface, a similar deep incision is made in the scion upwards, at a corresponding angle, and, a projecting tongue left, which being inserted in the incision in the stock, they are fastened closely together. *Splice-grafting* is performed by cutting the ends of the scion and stock completely across in an oblique direction, in such a way that the sections are of the same shape, then laying the oblique surfaces together so that the one exactly fits the other, and securing them by tying or otherwise. In *cleft-grafting*, the stock is cleft down, and the graft, cut in the shape of a wedge at its lower end, is inserted into the cleft; while, in *saddle-grafting*, the end of the stock is cut into the form of a wedge, and the base of the scion, slit up or cleft for the purpose, is affixed. *Crown-grafting* or *rind-grafting* is performed by cutting the lower end of the scion in a sloping direction, while the head of the stock is cut over horizontally and a slit is made through the inner bark. A piece of wood, bone, ivory, or other such substance, resembling the thinned end of the scion, is inserted in the top of the slit between the alburnum and inner bark and pushed down in order to raise the bark, so that the thin end of the scion may be introduced without being bruised. The edges of the bark on each side are then brought close to the scion, and the whole is bound with matting and a lump of clay put round it. 3. *By buds.*—This consists in transferring to another stock a plate of bark, to which one or more buds adhere. Bud-grafting is the most commonly practised, especially for multiplying fruit-trees and roses, owing to the facility with which it may be performed.

Grafton, Augustus Henry, Third Duke of, born 1735. He was secretary of state under Rockingham, first lord of treasury under the elder Pitt, and premier during the illness of the latter (now Lord Chatham). He subsequently held the privy seal under Lord North, and again under Rockingham, but ultimately gave up politics. He died in 1811. He is chiefly remembered as the subject of some of the most brilliant of the letters of Junius.

Gragnano (grä-nyä'nō), a town, Italy, province of Naples. It has two annual fairs, and is chiefly of interest for its wines and macaroni. Pop. 8611.

Graham (grăm or grā'am), GEORGE, mechanician and watchmaker, born in Cumberland 1675. He succeeded Tompion the watchmaker in business in London, and invented several important astronomical instruments. He invented the dead-beat escapement and a compensation pendulum for clocks.

Graham, JAMES. See *Montrose, Marquis of.*

Graham, JOHN, Viscount Dundee, commonly known as Claverhouse, eldest son of Sir William Graham of Claverhouse, was born about 1650, and educated at St. Andrews. He went abroad and entered the service of France and afterwards of Holland, but, failing to obtain the command of a Scottish regiment in the Dutch service, he returned to Scotland in 1677, where he was appointed captain of a troop of horse raised to enforce compliance with the establishment of Episcopacy. He distinguished himself by an unscrupulous zeal in this service, especially after the murder of Archbishop Sharpe in May, 1679. The Covenanters were driven to resistance, and a body of them defeated Claverhouse at Drumclog on 1st June. On the 22d, however, the Duke of Monmouth defeated the insurgents at Bothwell Brig, and Claverhouse was sent into the west with absolute power. In 1682 he was appointed sheriff of Wigtonshire, and, assisted by his brother David, continued his persecutions. He was made a privy-councillor, and received the estate of Dudhope, with other honours from the king, and although on the accession of James his name was withdrawn from the privy-council it was soon restored. In 1686 he was made brigadier general, and afterwards major-general; and in 1688, after William had landed, he received from James in London the titles of Lord Graham of Claverhouse and Viscount Dundee. When the king fled he returned to Edinburgh, but finding the Covenanters in possession he retired to the north, followed by General Mackay. After making an attempt on Dundee, Claverhouse finally encountered and defeated Mackay in the Pass of Killiecrankie (17th July, 1689), but was killed in the battle.

Graham, THOMAS, D.C.L., F.R.S., master of the mint, an eminent chemist, was born at Glasgow in 1805, and educated at Glasgow University. In 1827 he commenced teaching private mathematical classes in Glasgow, and in 1829 succeeded to the lectureship of chemistry in the Mechanics' Institution. In 1830 he was appointed professor of chemistry in the Andersonian University. In 1831 he established the law that gases tend to diffuse inversely as the square root of their specific gravities. He afterwards made a series of investigations into the constitution of arseniates, phosphates, and phosphoretted hydrogen, and into the function of water in different salts. In 1837 he was elected professor of chemistry in the University of London, and soon after settling in the metropolis he was appointed assayer to the mint. In 1841 he was chosen first president of the Chemical Society, which he had assisted in founding; and in 1846 he assisted in founding the Cavendish Society, over which he presided. He read the Bakerian lecture in 1849 and in 1854, the subject of both being the diffusion of liquids, which he further treated before the Royal Society in 1861. He distinguished the crystalloids and colloids in liquid solutions, and gave to their separation the name of *dialysis*. In a subsequent paper, Philosophical Transactions, 1866, he applied these discoveries to gases, under the name of *atmolysis*. The passage of gases through heated metal plates and the occlusion of gases were also ably investigated by him. He died in 1869.

Grahame (grăm or grā'am), JAMES, Scottish poet, born in Glasgow in 1765. He studied law in Edinburgh, and in 1791 became a Writer to the Signet. In 1795 he was admitted to the Faculty of Advocates, of which he continued a member until 1809, when he took orders as a clergyman of the Church of England. Previous to this all his literary productions had been published. While at the university he printed and circulated a collection of poetical pieces. These appeared in an amended form in 1797. In 1801 he published a dramatic poem entitled Mary, Queen of Scotland, and in 1802 appeared, anonymously, The Sabbath. The Birds of Scotland, and British Georgics followed. He subsequently held curacies at Shefton, Durham, and Sedgefield, but his health gave way, and he died at Glasgow in 1811.

Graham Island, or FERDINANDEA, a volcanic island which in July, 1831, rose up in the Mediterranean, about 30 miles southwest of Sciacca, in Sicily. It attained a height of 200 feet, with a circuit of 3 miles, but disappeared in August. It reappeared for a short time in 1863.

Graham Land, a tract of land in the Antarctic Ocean; discovered in 1832 by

Biscoe, who took possession of it for Great Britain. It stretches between lat. 63° and 68° s., and lon. 61° and 68° w.

Grahamstown, a town of Cape Colony, the metropolis of the Eastern Provinces, on the slopes of the Zuurberg. It is a well-built thriving place, with a town-hall, an Anglican and a R.C. cathedral, colleges and schools, botanic garden, &c. Pop. 10,436.

Grail (variously spelt *Greal, Graal, Grazal, Grasal*, &c.), the legendary holy vessel, supposed to have been of emerald, from which Christ dispensed the wine at the last supper. It was said to have been brought to England by Joseph of Arimathea, but to have been taken back to heaven until the appearance of heroes worthy to be its guardians. Titurel, a descendant of the Asiatic prince Perillus, whose descendants had allied themselves with the family of a Breton sovereign, was chosen as its keeper. He erected for it a temple on the model of that at Jerusalem, and organized a band of guardians. It was visible only to the baptized and pure of heart. With this legend that of King Arthur became connected. Three of his knights, Galahad, Percival, and Bors, had sight of it, and on the death of Percival, its last guardian, it was again taken to heaven.

Grain, the name of a small weight, the twentieth part of a scruple in apothecaries' weight, and the twenty-fourth of a pennyweight troy. See *Avoirdupois*.

Grain includes all those kinds of grass which are cultivated on account of their seeds for the production of meal or flour. All kinds of grain contain in varying quantities the following elements: gluten, fecula or starch, a sweet mucilage, a digestible aromatic substance contained in the hulls, and moisture, which is predominant even in the driest grain, and serves, after planting, to stimulate the first motions of the germ.

Grain Coast, the former name of Liberia, on the west coast of Africa. See *Grains of Paradise*.

Grain Elevator. See *Elevator*.

Graining (*Leuciscus Lancastriensis*), a fish of the dace kind, found chiefly in the Mersey and its tributaries, and in some of the Swiss lakes. The nose is more rounded than that of the dace, the eye larger, and the dorsal fin commences half-way between the point of the nose and the end of the fleshy portion of the tail. It seldom weighs more than half a pound; in habit and food it resembles the trout.

Grain-leather, dressed horse-hides, goat-skins, seal-skins, &c., blacked on the grain side, that is the hair side, for shoes, boots, &c.

Grain-moth, a minute moth of which two species are known, *Tinea granella* and *Butalis cerealella*, whose larvæ or grubs devour grain in granaries. The moths have narrow, fringed wings, of a satiny lustre.

Grains of Paradise, Guinea grains or Malaguetta pepper, the pungent somewhat aromatic seeds of *Amōmum Meleguetta*, nat. order Zingiberaceæ, a plant of tropical Western Africa. They are chiefly used in cattle medicines and to give a fiery pungency to cordials. The 'Grain Coast' of Africa takes its name from the production of these seeds in that region.

Grak'le (*Gracŭla*), a genus of birds of the order Passeres, and of the starling family (Sturnidæ), inhabiting India and New Guinea. One of the genus is the Indian mina bird (*G. musica*), which can be taught amusing tricks and can imitate the human voice. It is of a deep velvet black, with a white spot on the wing, yellow bill and feet, and two yellow wattles on the back of the head. A considerable number of other birds not belonging to this genus have also been called grakles, such as the purple grakle, or crow-blackbird of America. See *Crow-blackbird*.

Grallato'res, an order of birds which formerly included the heron, ibis, stork; but these are now put into another order, and the Grallatores, properly so called, consist of the following families, namely, those of the snipe, stint, and ruff; the red-shanks, green-shanks, and sand-pipers; the curlews, phalaropes, stilts, and avocets; the plovers, oyster-catchers, turnstones, lapwings, coursers; the jacanas, the bustards; the rails and coots; and the cranes. They are generally known as wading-birds, as they frequent shores and banks of streams, marshes, &c., and their legs and beak are commonly rather long.



Grallatores.—Head and Foot of Crane.

Gram, the chick-pea (*Cicer arietinum*), used extensively in India as fodder for horses and cattle.

Gramineæ. See *Grasses*.

Grammar, in reference to any language, is the system of rules, principles, and facts which must be known in order to speak and write the language correctly. *Comparative grammar* treats of the laws, customs, and forms which are shown by comparison to be common to various languages; *general* or *universal grammar*, of those laws which, by logical deduction, are demonstrated to be common to all. The divisions of grammar vary with the class and also with the method of treatment. In common English grammars the division is generally fourfold: *orthography*, which treats of the proper spelling of words, and includes orthoepy, treating of the proper pronunciation; *etymology*, which treats of their derivations and inflections; *syntax*, of the laws and forms of construction common to compositions in prose and verse; *prosody*, of the laws peculiar to verse. Although the systematization of grammar had begun in some sort in Plato's time it was chiefly to the Alexandrian writers that it owed its development. The first Greek grammar for Roman students was that of Dionysius Thrax, in use about 80 B.C. Comparative grammar can only be said to have existed from the beginning of the present century, when the critical study of Sanskrit established the affinities of the languages of the Indo-European group. The names of Bopp, Grimm, Pott, Schleicher, Müller, &c., are especially associated with its development.

Grammar-schools, an old name of a class of schools at which a secondary education is given, as a preparation for a university course. The term seems to have arisen from the once almost exclusive occupation of these schools in the teaching of the elements or grammar of the Latin and Greek languages. In England the character of the teaching in secondary schools, where not restricted by endowments, is necessarily influenced by the course of instruction in the universities, in which the classical element still preponderates. In Scotland, however, the grammar-schools appear rather to have led the movement to adapt the higher education to the practical requirements of modern life.

Gramme, the unit of weight in France = 15·4323 grains. A decagramme or ten grammes = 5·644 drams; a hectogramme (100 grammes) = 3·527 oz.; a kilogramme (1000 grammes) = 2·205 lbs.; a myriagramme (10,000 grammes) = 22·046 lbs.

Grammont, a town of Belgium, East Flanders, 22 miles S.S.E. of Ghent, on both sides of the Dender. Chief manufactures: linen, lace, thread, paper, tobacco-pipes, &c. Pop. 9964.

Grammont, ORDER OF (*Grandmontains*), a monastic order established by Stephen of Thiers in 1076 at Muret, but afterwards (1124) removed to Grandmont. The order became extinct at the Revolution.

Gramont, or GRAMMONT, PHILIBERT, COUNT DE, son of Anthony, duke of Grammont, born in 1621. He served under the Prince of Condé and Turenne, went to England two years after the Restoration, and was highly distinguished by Charles II. After a long course of gallantry he married, under compulsion, Miss Elizabeth Hamilton, and died in 1707. His memoirs were dictated to his brother-in-law, Anthony, count Hamilton, who followed James II., entered the French service, and died in 1720.

Grampian Mountains, a range, or rather series of ranges and elevated masses, stretching across Scotland diagonally S.W. to N.E. for about 150 miles. It commences in Argyleshire, and at the boundaries of Perthshire and Aberdeenshire may be said to separate into two distinct branches—one on the north side of the Dee, terminating near Huntly; the other running on the south side of that river, and terminating near Stonehaven. With exception of Ben Nevis, the Grampians comprise all the highest mountains in Scotland, Ben Cruachan, Ben Lomond, Ben Lawers, Schiehallion, Ben Macdhui (4296 feet), Cairngorm, Cairntoul, &c. The more remarkable passes are those of Leney, Aberfoyle, Glenshee, and Killiecrankie.

Grampus, a name for several marine cetaceous mammals allied to the dolphins, especially *Orca gladiator* of the Atlantic and North Sea, which grows to the length of 25 feet, and is remarkably thick in proportion to its length. The spout-hole is on the top of the neck. The colour of the back is black; the belly is of a snowy whiteness, and on each shoulder is a large white spot. The grampus is carnivorous and remarkably voracious, even attacking the whale.

Gran, a town in Hungary, at the confluence of the Gran with the Danube, 25 miles north-west of Budapest. It was the residence of the Hungarian monarchs, and their finest city till ruined by the Turks about 1613. It is an archbishop's see and has a fine cathedral. Pop. 8932.

Granada (grȧ-nä′dȧ), a city in the south of Spain, capital of the province of Gra-

nada. The streets rise picturesquely above each other, with a number of turrets and gilded cupolas, the whole being crowned by the Alhambra (which see), or palace of the ancient Moorish kings. In the background lies the Sierra de Nevada, covered with snow. The streets, however, are narrow and irregular, and the buildings inferior to those of many other towns in Spain. The town is partly built on two adjacent hills, between which the Darro flows, traversing the town and falling into the Genil, which flows outside the walls. The cathedral is an irregular but splendid building, and the archbishop's palace and mansion of the captain-general are also noteworthy; but the special features of the town are the Alhambra, and another Moorish palace called the *Generalife*, built on an opposite hill. Granada has no manufactures of importance. Its university was founded about 1530, and is attended by some 1000 students. The city was founded by the Moors before 800, and from 1036 to 1234 was included in the Kingdom of Cordova. In 1235 it became the capital of the Moorish kingdom of Granada, and attained almost matchless splendour. In 1491 it remained the last stronghold of the Moors in Spain, but was taken by the Spaniards under Ferdinand and Isabella in 1492, along with the kingdom, having then a population of perhaps 500,000. Its prosperity continued almost without diminution till 1610, when the decree expelling the Moors from all parts of Spain told severely upon it, and it has never recovered. Pop. 73,006.—The province, which is partly bounded by the Mediterranean, has an area of 5610 sq. miles. Pop. 478,846. See next article.

Granada, formerly a Moorish kingdom in Spain, bordering on the Mediterranean, now represented by the three provinces, Granada, Almeria, and Malaga; area, 11,000 sq. miles. The interior is mountainous, being traversed from east to west by several ranges, particularly the Sierra Nevada; but many of its valleys and low grounds are distinguished by beauty and fertility. The olive and vine are extensively cultivated, and fruit is very abundant. The sugar-cane thrives in some parts. After long forming part of the kingdom of Cordova, Granada became a separate kingdom in 1235. In 1492 it passed into the possession of the Spaniards.

Granadil'la, the West Indian name for the fruits of various species of *Passiflōra*, a genus of the passion-flower family. Some species have been introduced into Europe, chiefly for their flowers, the chief being the purple-fruited, *P. edūlis;* the water-lemon, *P. laurifolia;* the flesh-coloured granadilla, and the *P. quadrangulāris*, the most valuable for cultivation in Great Britain.

Granby, JOHN MANNERS, MARQUIS OF, son of the Duke of Rutland, born 1721; educated at Eton and Cambridge; raised a foot regiment in 1745; became colonel of horse-guards in 1758 and lieutenant-general in 1759; commanded the British troops in the Seven Years' war (1760–63), and was commander-in-chief of the British army from 1766 to 1770, the year of his death. He was elected to parliament in 1754, 1761, and 1768. His immense popularity, which was, however, scarcely earned by his merits as a general, was in part attested by the frequent use of his name for inns and public-houses.

Gran Chaco, EL, a territory of the Argentine Republic, lying mainly between the Vermejo, Paraná, and Salado. In the west it is intersected by offsets of the Andes, and in the east forms extensive plains and marshes, while in the south are sandy deserts interspersed with salt pools. Greater part, however, is covered with primeval forest. It is inhabited by various Indian tribes, the total Indian population being estimated at from 20,000 to 40,000. The Central Chaco, recently explored with a view to colonization, seems well adapted for growing sugar-cane, tobacco, maize, rice, &c., but not for cereals generally. The name is also applied to a much more extensive territory of similar character extending into Bolivia.

Grand Coustumier of Normandy, a collection of ancient laws or customs of the Duchy of Normandy, in use in England during the reigns of the early Norman sovereigns, and which still form the basis of the laws of the Channel Isles, which formerly belonged to that duchy. It is supposed to have been compiled subsequently to the reign of Richard I.

Grand-duke, the title of the sovereign of several of the states of Germany, who are considered to be of a rank between duke and king; also applied to members of the imperial family of Russia.

Grandee', in Spain a noble of the first rank, which consisted partly of the relatives of the royal house, and partly of such members of the high feudal nobility distinguished for their wealth as had, by the grant of a banner received from the king, the right to

enlist soldiers under their own colours. Besides the general prerogatives of the higher nobility, and the priority of claim to the highest offices of state, the grandees possessed the right of covering the head in the presence of the king, with his permission, on all public occasions. The king called each of them 'my cousin' (*mi primo*), while he addressed the other members of the high nobility only as 'my kinsman' (*mi pariente*). Under Ferdinand and Isabella and Charles V. the independent feudal nobility became a dependent order of court nobles, and their privileges were curtailed.

Grand Jury. See *Jury.*

Grand Pensionary, formerly an officer of the Dutch Republic, or rather of the Province of Holland. In the great towns of the Dutch Republic the first magistrate was called a pensionary, from the fact of his office being a paid one. The grand pensionary was the secretary of state of the Province of Holland. He held office for five years, and was eligible for re-election. The office was abolished on the formation of the Kingdom of Holland in 1806.

Grand Pré, a beautiful village on the basin of Minas, King's County, Nova Scotia; the scene of Longfellow's Evangeline. The French settlers there were expelled by Virginian colonists in 1613. Pop. 1600.

Grand Prix (grän prē). See *École des Beaux Arts.*

Grand Rapids, a city, United States, capital of Kent county, Michigan, situated on the rapids of the Grand River, 40 miles from its mouth. It is handsomely built, and has a pleasant and healthy situation. It is connected with the railway system of the United States and Canada, and is an important centre for the distribution of pine and hard-wood lumber. It has large manufactures of furniture, wooden ware, agricultural implements, brushes, machinery, &c. Pop. (1890), 60,278.

Grand Sergeanty, an ancient tenure of land similar to knight-service, but of superior dignity. Instead of serving the king generally in his wars, the holder by this tenure was bound to do him some specified honorary service, to carry his sword or banner, to be the marshal of his host, his high-steward, butler, champion, or other officer. It was practically abolished with other military tenures by Charles II.

Grange, in the United States, a combination, society, or lodge of farmers for the purpose of promoting the interests of agriculture, more especially for abolishing the restraints and burdens imposed on it by the commercial classes, the railroad and canal companies, &c., and for doing away with middlemen. Granges originated in the great agricultural regions of the Mississippi, and still prevail most generally there.

Grangemouth, a seaport and police burgh, Stirlingshire, Scotland, at the entrance of the Forth and Clyde Canal, 3 miles E.N.E. of Falkirk. The town was founded in 1777 in connection with the construction of the canal; its prosperity was increased by the opening of docks in 1843, 1859, and 1882. It has shipbuilding-yards, saw-mills, a rope and sail factory, and brick-works. Pop. (1891), 6354.

Granier de Cassagnac. See *Cassagnac.*

Gran'ilite, indeterminate granite; granite that contains more than three constituent parts.

Granil'la, the dust or small grains of the cochineal insect.

Granite, an unstratified rock, composed generally of the minerals quartz, felspar, and mica, mixed up without regular arrangement of the crystals. The grains vary in size from that of a pin's head to a mass of 2 or 3 feet, but they seldom exceed the size of a large gaming die. When they are of this size, or larger, the granite is said to be 'coarse-grained.' Granite is an igneous or fire-formed rock which has been exposed to great heat and pressure deep down in the earth. It is one of the most abundant of the igneous rocks seen at or near the surface of the earth, and was formerly considered as the foundation rock of the globe, or that upon which all sedimentary rocks repose; but it is now known to belong to various ages from the Pre-Cambrian to the Tertiary, the Alps of Europe containing granite of the later age. In Alpine situations it presents the appearance of having broken through the more superficial strata; the beds of other rocks in the vicinity rising towards it at increasing angles of elevation as they approach it. It forms some of the most lofty of the mountain chains of the eastern continent, and the central parts of the principal mountain ranges of Scandinavia, the Alps, the Pyrenees, and the Carpathian Mountains are of this rock. Granite supplies the most durable materials for building, as many of the ancient Egyptian monuments testify. It varies much in hardness as well as in colour, in accordance with the nature and proportion of its constituent parts, so

that there is much room for care and taste in its selection. Granite in which felspar predominates is not well adapted for buildings, as it cracks and crumbles down in a few years. The Aberdeen bluish-gray granite is celebrated for its great durability, and also for its beauty. The Peterhead red granite, the hue of which is due to its felspar being the flesh-coloured potash variety called orthoclase, is highly esteemed for polished work, as columns, pillars, graveyard monuments, &c. Granite in which mica is replaced by hornblende is called *syenite;* when both mica and hornblende are present it is called *syenitic granite;* when talc supplants mica it is called *protogene, talcose*, or *chloritic granite;* a mixture of quartz and hypersthene, with scattered flakes of mica, is called *hypersthenic granite;* and the name of *graphic granite*, or *pegmatite*, is given to a variety composed of felspar and quartz, with a little white mica, so arranged as to produce an irregular laminar structure. When a section of this latter mineral is made at right angles to the alternations of the constituent materials, broken lines resembling Hebrew characters present themselves; hence the name. Granite abounds in crystallized earthy minerals; and these occur for the most part in veins traversing the mass of the rock. Of these minerals beryl, garnet, and tourmaline are the most abundant. It is not rich in metallic ores. The *oriental basalt*, found in rolled masses in the deserts of Egypt, and of which the Egyptians made their statues, is a true granite, its black colour being caused by the presence of hornblende and the black shade of the mica. The *oriental red granite* chiefly found in Egypt, and of which Pompey's Pillar and Cleopatra's Needles were constructed, is composed of large grains or imperfectly formed crystals of flesh-coloured felspar, of transparent quartz, and of black hornblende.

Granja (grän'*hä*), La. See *Ildefonso.*

Grano, a money of account in Malta, equal to about $\frac{1}{12}d.$ sterling.

Gran Sasso D'Italia, or Monte Corno, a mountain of Naples, the culminating peak of the Apennines; height, 9519 feet.

Grant, in law, a gift in writing of such a thing as cannot be passed or conveyed by word only; thus, a grant is the regular method by the common law of transferring the property of incorporeal hereditaments, or such things whereof no actual delivery of possession can be had.

Grant, Sir Alexander, Bart., born in 1826; educated at Harrow and Oxford, where he became public examiner. In 1858 he was appointed inspector of schools in the Madras presidency; became professor of history and political economy in Elphinstone College, Madras, in 1860, and its principal in 1862; vice-chancellor of Bombay University in 1863; director of public instruction in Bombay Presidency, 1865; and vice-chancellor and principal of Edinburgh University in 1868. He died in 1884. He is best known by his annotated edition of Aristotle's Ethics (first published 1857), and his Story of the University of Edinburgh (1884), published in connection with the University Tercentenary.

Grant, George Munro, D.D., Canadian author and educationalist, born in Nova Scotia in 1835. He was educated at Pictou Academy, and at West River Seminary of the Presbyterian Church of Nova Scotia, gaining there a bursary which entitled him to continue his studies at Glasgow University. Here he studied with distinction both in arts and theology, and took the degree of M.A. Returning to Canada he was for some time a missionary, then pastor of St. Matthew's Church, Halifax. In 1877 he was appointed principal of Queen's University, Kingston, Ontario, a position which he has filled with great ability. He has written Ocean to Ocean, being the account of a tour across the Dominion; has edited Picturesque Canada, and contributed to various periodicals.

Grant, James, novelist, born at Edinburgh 1822; lived in America from 1832 to 1839, in which year he returned to England, and was gazetted ensign in the 62d Foot. He resigned his commission in 1843; began to contribute to periodical literature, and in 1846 published his first book, The Romance of War. A large number of works followed, most of them bearing marks of his military training, or based on historical events, Adventures of an Aide-de-Camp (1848), Bothwell (1851), Jane Seton (1853), Philip Rollo (1854), Frank Hilton (1855), Yellow Frigate (1855), Harry Ogilvie (1856), Lucy Arden (1859), Mary of Lorraine (1860), Dick Rodney (1861), King's Own Borderers (1865), White Cockade (1867), British Battles on Land and Sea (1873), Old and New Edinburgh (1880–83), &c. He became a Roman Catholic in 1875, and died in 1887.

Grant, Mrs., of Laggan, a distinguished Scottish authoress, born at Glasgow in 1755,

maiden name M'Vicar. Her husband, the Rev. James Grant of Laggan, died in 1801, and left her a widow, with eight children, in very embarrassed circumstances. In 1803 she published by subscription a volume of poems, and in 1806 won reputation by her Letters from the Mountains, a series of letters describing her life in the Highlands, the character of the people, and the natural scenery. For some time she conducted a boarding establishment for young ladies in Edinburgh. Her chief subsequent works are her Memoirs of an American Lady, and Essays on the Superstitions of the Highlanders of Scotland (1811); Eighteen Hundred and Thirteen, a poem (1814), and her Memoirs, published posthumously in 1844. In 1825 she obtained a pension from government, and she died at Edinburgh in 1838.

Grant, ULYSSES S., general and president of the United States, born in 1822 at Point Pleasant, in Clermont co., Ohio. His real name was Hiram Ulysses Grant, the name afterwards used by him having arisen out of an error in the registration of his cadetship. After having studied in the military academy at West Point he served during the Mexican war, taking part in every battle except Buena Vista, and being brevetted captain for gallantry. In 1854 he resigned his commission and engaged first in farming near St. Louis, and then in the leather trade with his father at Galena, Illinois. On the declaration of war in 1861 he was chosen captain of a company of volunteers, and was rapidly promoted to a brigadier-generalship of volunteers. He seized Paducah, commanding the Tennessee and Ohio navigation; checked the departure of reinforcements from Belmont, captured Fort Henry and Fort Donelson, and won the two days' battle of Shiloh. He then gained a new victory at Juka, and after repulsing the Confederates before Corinth commenced operations against Vicksburg. After a siege of some months, in the course of which he took the town of Jackson and scattered an army under Johnston, the town surrendered. For this Grant was made major-general in the regular army, and placed in command of the Mississippi division. The battles of Chickamauga and Chattanooga, which followed, opened the way into Georgia for the Federal troops. In Feb. 1864 he was appointed lieutenant-general, and assumed command of the armies of the United States. In a succession of hotly-contested battles at the Wilderness, Spottsylvania, North Anna, and Cold Harbour, he steadily advanced on Petersburg and Richmond. These speedily fell, and Lee, defeated at Five Forks and completely surrounded, surrendered to Grant, April 9, 1865. Grant returned to Washington, and in 1866 was made general



General Grant.

of the armies of the United States. After exercising an important influence during the presidency of Johnson, Lincoln's successor, he was himself elected president in 1868. His administration allayed the soreness which still survived from the great struggle between the states, and was also noteworthy for the reduction of the national debt and the settlement of the Alabama dispute with England. He was re-elected in 1872. On his retirement he spent some time in travel. Latterly he became involved in a bubble company which exploited his name and left him heavily in debt. He manfully endeavoured to repair his fortune by writing and publishing his Memoirs, and in this he was successful, though suffering greatly from the cancerous disease of which he died in 1885.

Grantham (grant'am), municipal and parliamentary borough of England, in Lincolnshire, 22½ miles S.S.W. of Lincoln, returning one member to parliament. It is well built, principally of brick, and has a fine Gothic church of the 13th century, with a tower and spire 273 feet high, recently restored. The town-hall has a handsome clock-tower. The industries are mostly connected with agriculture. Pop. 17,170.

Granulation, the subdivision of a metal into small pieces or thin films, effected either by pouring the metal in a fine stream or through a sieve into water. It is employed

in chemistry to increase the surface, so as to render the metal more susceptible to the action of reagents, and in metallurgy for the subdivision of a tough metal like copper. Small shot is made by a species of granulation.

Granulation, in surgery, the formation of little grain-like fleshy bodies on the surfaces of ulcers and suppurating wounds, serving both for filling up the cavities and bringing nearer together and uniting their sides. The colour of healthy granulations is a deep florid red. When livid they are unhealthy, and have only a languid circulation.

Granvella, or GRANVELLE, ANTOINE PERRENOT, CARDINAL DE, minister of state to Charles V. and Philip II. of Spain, was born in 1517 near Besançon. He studied at Padua and at Louvain, in his twenty-third year was appointed Bishop of Arras, and was present at the diets at Worms and Ratisbon. In 1545 he was sent to the Council of Trent, and on the death of his father in 1550 was appointed by Charles V. to succeed him in the office of chancellor. In 1552 he negotiated the Treaty of Passau, and in 1553 arranged the marriage of Don Philip with Mary Queen of England. Under Philip II. he remained chief minister, and in 1559 negotiated the Peace of Câteau-Cambrésis. Philip immediately after quitted the Netherlands, leaving Margaret of Parma as governor, and Granvella as her minister. In 1560 he became Archbishop of Mechlin, and in 1561 was made a cardinal; but in 1564 he was obliged to yield to the growing discontent aroused by his tyranny in the Netherlands, resign his post, and retire to Besançon. In 1570 Philip sent him to Rome to conclude an alliance with the pope and the Venetians against the Turks, and afterwards to Naples as viceroy. In 1575 he was recalled to Spain, and placed at the head of the government with the title of President of the Supreme Council of Italy and Castile. In 1584 he was created Archbishop of Besançon, and died at Madrid in 1586. He preserved all letters and despatches addressed to him, nine volumes of which, published 1851–62, are of value in illustrating the history of the 16th century.

Granville (grän-vēl), a fortified seaport, France, department of Manche, at the mouth of the Boscq, in the English Channel. Pop. 11,620.

Granville, GRANVILLE GEORGE LEVESON-GOWER, 2D EARL, K.G., English statesman, was born in London in 1815; educated at Eton and Christ Church, Oxford; entered parliament in 1836 for Morpeth, afterwards for Lichfield, both in the Liberal interest. In 1840 he became under-secretary for foreign affairs, in 1846 succeeded to the peerage, in 1848 was appointed vice-president of the Board of Trade, and in 1851 succeeded Palmerston as foreign secretary. In 1855 he became chancellor of the Duchy of Lancaster, president of the council, and ministerial leader of the House of Lords (1855–58), and in 1856 represented the British crown at the coronation of the Czar Alexander. From 1859 to 1866 he was again president of the council. In 1868 he was colonial secretary under Gladstone, and on the death of Clarendon in 1870 succeeded to the secretaryship for foreign affairs, which he held until 1874. During this period he negotiated the Treaty of 1870, guaranteeing the independence of Belgium, and 'protested' against the Russian repudiation of the Black Sea clause of the Treaty of Paris. On the return of Gladstone to office in 1880 Lord Granville again became foreign secretary, until Lord Salisbury came into power in 1885. The close of the struggle with the Boers, the protest against the French occupation of Tunis, the revolt of Arabi Pasha in Egypt, the appearance of the Mahdi, the occupation of Egypt, the Gordon mission, and Wolseley expedition belong to this period. In the short Gladstone ministry of 1886 he was colonial secretary. He died in 1891.

Grape. See *Vine.*


Grape-shot.

Grape-shot, a kind of shot generally consisting of three tiers of cast-iron balls arranged, three in a tier, between four parallel iron discs connected together by a central wrought-iron pin. Case-shot is now more used than grape-shot.

Grape-sugar. See *Glucose.*

Graph'ite, one of the forms under which carbon occurs in nature, also known under the names of *Plumbago*, *Black-lead*, and *Wad.* It occurs not unfrequently as a mineral production, and is found in great purity at Borrowdale in Cumberland, and in large quantities in Canada, Ceylon, and Bohemia. Graphite may be heated to any extent in close vessels without change; it is exceedingly unchangeable in the air; it has an iron-gray colour, metallic lustre, and granular texture, and is soft and unctuous to

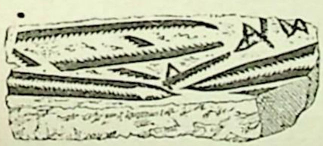
the touch. It is used chiefly in the manufacture of pencils, crucibles, and portable furnaces, in burnishing iron to protect it from rust, for giving a smooth surface to casting moulds, for coating wax or other impressions of objects designed to be electrotyped, and for counteracting friction between the rubbing surfaces of wood or metal in machinery.

Graph'otype, a process for obtaining blocks for surface printing, discovered in 1860 by De Witt Clinton Hitchcock, who observed that, on rubbing the enamel from a visiting-card with a brush and water, the printed letters stood out in relief, the ink having so hardened the enamel that it resisted the action of the brush. The first graphotype drawings were made on blocks of chalk with siliceous ink, but the chalk-block was soon superseded by the use of French chalk ground to the finest powder, laid on a smooth plate of zinc, submitted to intense hydraulic pressure, and then sized. The drawing is made with sable-hair brushes and ink composed of lamp-black and glue, and when finished is gently rubbed with silk velvet or fitch-hair brushes until the chalk between the ink lines is removed to the depth of $\frac{1}{8}$ inch. The block is then hardened by being steeped in an alkaline silicate, and moulds being taken from it, stereotype plates are cast for printing.

Grapnel, or GRAPLING, a sort of small anchor, fitted with four or five flukes or claws, and commonly used to fasten boats or other small vessels. The name was also given to the grappling-iron formerly used in naval engagements to hold one ship to another.

Grapple-plant, the Cape name of the *Harpagophytum procumbens*, a South African procumbent plant of the nat. order Pedaliaceæ. The seeds have many hooked thorns, and cling to the mouths of grazing cattle, causing considerable pain.

Grap'tolite, one of a genus (*Graptolithus*)



Block of Stone containing Graptolites.

of fossil hydrozoa, agreeing with the living sertularians in having a horny polypary, and in having the separate zooids protected by little horny cups, all springing from a common flesh or cœnosarc, but differing in that they were not fixed to any solid object, but were permanently free. Graptolites usually present themselves as silvery impressions on hard black shales of the Silurian system, presenting the appearance of fossil pens, &c.; whence the name.

Graslitz, a town of Bohemia, on the Zwoda, 89 miles W.N.W. Prague. Pop. 7850.

Grasmere, a beautiful lake, England, county of Westmoreland, of oval form, about 1 mile long by $\frac{1}{2}$ mile broad. The village of Grasmere is at the head of the lake.

Grass-cloth, the name of certain beautiful light fabrics made in the East from the fibre of *Boehmeria nivea*, or China grass, *Bromelia Pigna*, &c. None of the plants yielding the fibre are grasses.

Grasse (grâs), a town, France, department of Alpes Maritimes, 23 miles E.N.E. of Draguignan. It has extensive manufactures of perfumery. Pop. 7624.

Grasses, a name equivalent to the botanical order Graminaceæ, a very extensive and important order of endogenous plants, comprising about 250 genera and 4500 species, including many of the most valuable pasture-plants, all those which yield corn, the sugar-cane, the tall and graceful bamboo, &c. The nutritious herbage and farinaceous seed furnished by many of them render them of incalculable importance, while the stems and leaves are useful for various textile and other purposes. The roots are fibrous; the stem or culm is usually cylindrical and jointed, varying in length from a few inches to 80 or 90 feet, as in the bamboo (in the sugar-cane the stem is solid, but porous), and coated with silex; leaves, one to each node or joint, with a sheathing petiole; spikelets terminal, panicled, racemose, or spiked; flowers hermaphrodite or polygamous, destitute of true calyx or corolla, surrounded by a double set of bracts, the outer constituting the *glumes*, the inner the *paleæ;* stamens hypogynous, three or six; filaments long and flaccid; anthers versatile; ovary solitary, simple, with two (rarely three) styles, one-celled, with a single ovule; fruit known as a *caryopsis*, the seed and the pericarp being inseparable from each other. The more important divisions of the natural order of grasses are: (1) *Panicaceæ*, including the *Paniceæ* (millet, fundi, Guinea grass); the *Andropogoneæ* (sugar-cane, dhurra, lemon-grass); the *Rottboellieæ* (gama-grass); &c.

(2) *Phalarideæ* (maize, Job's tears, canary-grass, foxtail-grass, soft-grass, Timothy grass). (3) *Poaceæ*, including the *Oryzeæ* (rice); *Stipeæ* (feather-grass, esparto); *Agrosteæ* (bent-grass); *Aveneæ* (oats, vernal grass); *Festuceæ* (fescue, meadow-grass, manna-grass, teff, cock's-foot grass, tussac grass, dog's-tail grass); *Bambuseæ* (bamboo); *Hordeæ* (wheat, barley, rye, spelt, rye-grass, lyme-grass). In its popular use the term grasses is chiefly applied to the pasture grasses as distinct from the cereals, &c.; but it is also applied to some herbs, which are not in any strict sense grasses at all, *e.g.* rib-grass, scurvy and whitlow grass. After the culture of herbage and forage plants became an important branch of husbandry, it became customary to call the clovers, trefoils, sainfoin, and other flowering plants grown as fodder, *artificial grasses*, by way of distinction from the grasses proper, which were termed *natural grasses*. Of the pasture grasses, some thrive in meadows, others in marshes, on upland fields, or on bleak hills, and they by no means grow indiscriminately. Indeed the species of grass will often indicate the quality of the soil; thus, *Holcus*, *Dactylis*, and *Bromus* are found on sterile land, *Festūca* and *Alopecūrus* on a better soil, *Poa* and *Cynosūrus* are only found in the best pasture land. See *Dog's-tail Grass*, *Fescue*, *Foxtail*, *Meadow-grass*, *Tussac*, &c.

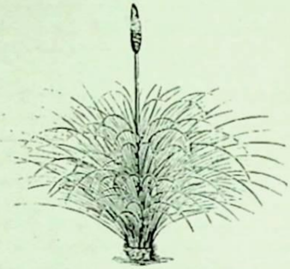
Grass-finch, GRASS-QUIT, names given to several birds belonging to the finch family, so called from feeding chiefly on the seeds of grasses.

Grass'hopper, the name of various leaping insects of the order Orthoptera nearly akin to the locusts. They are characterized by very long and slender legs, the thighs of the hinder legs being large and adapted for leaping, by large and delicate wings, and by the wing-covers extending far beyond the extremity of the abdomen. Grasshoppers form an extensive group of insects, and are distinguished by the power which they possess of leaping to a considerable distance, and by the stridulous or chirping noise the males produce by rubbing their wing-covers together. They are generally of a greenish colour.

Grass of Parnassus, a genus of plants, variously referred to the natural orders Droseraceæ and Saxifragaceæ, and found for the most part in boggy situations in the colder northern countries. The common grass of Parnassus (*Parnassia palustris*) is a beautiful autumnal plant with heart-shaped leaves and a single yellowish-white flower.

Grass-oil, OIL OF GERANIUM, or OIL OF SPIKENARD, a fragrant volatile oil, used chiefly in perfumery, and obtained from Indian grasses of the genus *Andropogon*.

Grass-tree, the popular name of a genus of Australian plants (*Xanthorrhœa*) of the nat. order Liliaceæ, having shrubby stems with tufts of long grass-like wiry foliage, from the centre of which arise the tall



Grass-tree (*Xanthorrhœa hastilis*).

flower-stalks, which sometimes reach the height of 15 or 20 feet, and bear dense cylindrical spikes of blossom at their summit. The base of the leaves forms, when roasted, an agreeable article of diet, and the leaves themselves are used as fodder for all kinds of cattle. A resin, known in commerce as *akaroid resin*, is obtained from all the species, which are also popularly known as black-boys.

Grass-wrack, or SEA-GRASS (*Zostēra marīna*), a phanerogamous plant belonging to the Naiadeæ, forming green beds at the bottom of the sea where it is of no great depth. It is common enough on the British and European coasts, and when dried is used for stuffing mattresses, and packing goods. The ash contains soda.

Gratian, otherwise GRATIANUS AUGUSTUS, Roman Emperor, eldest son of the Emperor Valentinian I. was born A.D. 359, and when only eight years of age raised by his father to the rank of Augustus. On the death of Valentinian in 375 the Eastern Empire remained subject to Valens, and Gratian was obliged to share the western part with his half-brother, Valentinian II., then four years old. In 378 he succeeded to the Eastern Empire, which he bestowed on Theodosius I. He was deserted by his soldiers while leading them against Maximus, and put to death at Lyons in the eighth year of his reign.

Gratian, otherwise FRANCISCUS GRATIANUS, a Benedictine of the 12th century, a native of Chiusi, and author of the Decretum; or, Concordia discordantium Canonum, a rich storehouse of the canon law of the middle ages.

Grati'ola, a genus of plants, the hedge-hyssop genus, nat. order Scrophulariaceæ, containing about twenty species of herbs, widely dispersed through the extra-tropical regions of the globe. *G. officinalis* grows in meadows in Europe. It is extremely bitter, and acts violently both as a purgative and emetic, and in overdoses it is a violent poison.

Grattan, HENRY, Irish orator and statesman, born at Dublin in 1746, educated at Trinity College and Middle Temple; called to the Irish bar in 1772, and in 1775 elected



Henry Grattan

member for Charlton in the parliament of Ireland. In 1780 he moved resolutions asserting the crown to be the only link between Britain and Ireland, and in 1782 led the volunteer movement, which was instrumental in securing the concession of independence to Ireland. For these services the Irish parliament voted him £50,000 and a house and lands. The corruption of its members and the uncertain relations with England resulted in the failure of 'Grattan's parliament.' Grattan himself became opposed to the popular feeling as represented by the United Irishmen, and in 1797 temporarily seceded from parliament, and lived in retirement. In 1800 he came forward as member for Wicklow to oppose the Union, and on the passage of Pitt's measure was returned to the imperial parliament in 1805 for Malton in Yorkshire, and in 1806 for Dublin. He supported the war policy of the administration, but was latterly chiefly occupied in promoting Catholic emancipation. He died in 1820, and was interred in Westminster Abbey.

Gratz, or GRAZ, a town of Austria, capital of Styria, picturesquely situated on the Mur, 90 miles south-west of Vienna. The older town, on the left bank, is connected with the suburbs Lend and Gries on the right by several bridges, besides a railway bridge. The Schlossberg rises 400 ft. above the river, but the fortifications of the town have given place to avenues and pleasure grounds. The cathedral of St. Ægidius, built in 1456, is a majestic Gothic structure with a fine altar and paintings; near it is the mausoleum of Ferdinand II. The university, founded in 1586, has over 1100 students and a library of 80,000 vols. The Joanneum, for the promotion of agriculture and scientific education, has a large library and museums. The manufactures consist of woollen, cotton, and silk tissues, machinery, steel, rails, wagons, soap, leather, ironware, &c. Pop. 112,069.

Graubünden. See *Grisons*.

Graudenz (grou'dents), a town of Germany, West Prussia, right bank of the Vistula, 18 miles s.s.w. of Marienwerder. The manufactures include machinery, castings, cigars, tobacco, brushes, &c., and there are several breweries and distilleries. Pop. 17,336.

Gravel, in pathology, small concretions or calculi in the kidneys or bladder. See *Calculus*.

Gravelines (gräv-lēn), a small seaport and second-class fortress, France, department Nord. Pop. 2228.

Gravelotte (gräv-lot), a village, Germany, province of Elsass-Lothringen, 7 miles west of Metz, the scene of one of the fiercest battles of the Franco-German war, resulting in the retreat of the French to Metz.

Graver. See *Engraving*.

Gravesend, a municipal and parliamentary borough of England in Kent, on the south bank of the Thames, 21 miles east of London. It is a great rendezvous for shipping, the boundary port of London, and troops and passengers frequently embark there to avoid the passage down the river. There is some trade in supplying ships' stores, and boat-building, iron-founding, &c., are carried on.

It returns one member to parliament. Pop. parl. bor. (1891), 35,492.

Gravi'na, a town of South Italy, province of Bari, on the Gravina. It has a cathedral, convents, and a college. Pop. 14,125.

Graving, the act of cleaning and repairing a ship's bottom. At seaports this is usually done in a dry-dock called a *graving-dock*. See *Docks*.

Gravitation, the force by reason of which all the bodies and particles of matter in the universe tend towards one another. According to the law of gravitation discovered by Newton, every portion of matter attracts every other portion with a force directly proportional to the product of the two masses, and inversely proportional to the square of the distance between them. Kepler had given the laws, deduced from observation, according to which the planets describe their orbits. From these Newton deduced the laws of the force in the case of the planets; and subsequently he generalized the statement of them, by showing the identity of the nature of the force that retains the moon in her orbit, with that which attracts matter near to the surface of the earth. The application of the grand law that he had discovered subsequently occupied a large part of the mathematical labours of Newton. Attacking the problem of *lunar inequalities*, he accounted for them by considering the perturbations due to the attraction of various bodies of the solar system; and by accounting for all the observed perturbations by means of his newly-discovered law he confirmed the truth of the law itself in such a way as to put it beyond all question. The computation of these various attraotions has reached such a degree of accuracy in the hands of mathematicians since Newton, that the most complicated motions of the heavenly bodies can be predicted. The law has also been applied successfully in weighing the planets, explaining the paths of comets, the motions of the tidal wave, &c. It has also been demonstrated to hold good in the case of comparatively small bodies. Thus Maskelyne determined the attraction of a particular mountain, and Cavendish and Bailly measured the attraction of balls of lead on light finely-balanced bodies, and thus determined the mean density of the earth.

Gravity, the term applied to the force with which the earth attracts every particle of matter. The force of gravity is least at the equator, and gradually increases as we recede toward the poles. Thus a given mass, if tested by means of a spring-balance of sufficient delicacy, would appear to weigh least at the equator, and would seem to get heavier and heavier as the latitude increases. This is due to two causes: first, the centrifugal force at the equator is greater than that in high latitudes, because of the greater radius of the circle described at that place; and, second, the attraction is diminished by the greater distance of objects on the surface from the earth's centre. From both causes combined a body which weighs 194 lbs. at the equator would weigh 195 lbs. at either pole. Experiments to determine the force of gravity from point to point are made by determining the length of a pendulum that beats seconds at each place. By experiments made by Captain Kater at Leith Fort it was found that the force of gravity at that place is such that a body, unresisted by air or otherwise, would acquire in one second, under its influence, a velocity of 32·207 feet per second. At Greenwich the acceleration is 32·1912 feet.

Gravity, Specific. See *Specific Gravity*.

Gray (grā), a town, France, department of Haute-Saône, on the Saône. Pop. 6826.

Gray, Asa, American botanist, born 1810. He was appointed Fisher professor of natural history in Harvard University in 1842, and held the chair till 1873, when he retired from its more active duties. His death took place in 1888. His works include Elements of Botany (1836), A Manual of Botany (1848), and other botanical text-books; also portions of works on the flora of North America and the Genera Boreali-Americana, a Free Examination of Darwin's Treatise (1861), a volume entitled Darwiniana (1876), &c.

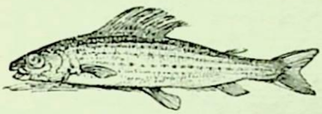
Gray, David, Scottish poet, born at Merkland, Dumbartonshire, in 1838; studied at Glasgow University, from which he went, with Robert Buchanan, to London in 1860 to try his fortune in literature. After a brief struggle consumption set in, and he died at Merkland in 1861. A small volume containing the poem entitled The Luggie, some lyrics, and a few sonnets, with the title In the Shadows, represents the whole of his work.

Gray, Thomas, English poet, born in London in 1716; educated at Eton with Horace Walpole, and at Cambridge. In 1738 he entered himself at the Inner Temple, but accompanied Walpole in his tour of Europe until they quarrelled in

Italy. He returned to England in 1741, and on the death of his father took up residence at Cambridge. In 1747 his Ode on a Distant Prospect of Eton College appeared, and in 1751 his Elegy written in a Country Churchyard, which went through four editions in two months. In 1757 he declined the laureateship, and the same year published his odes, On the Progress of Poesy, and The Bard. In 1759 he removed to London, where he resided for three years, and in 1768 the Duke of Grafton presented him with the professorship of modern history at Cambridge. He died in 1771, and was buried at Stoke Pogis, Buckinghamshire. His chief poems other than those mentioned were the Ode for Music and the fragmentary Essay on the Alliance of Education and Government. As a writer of Latin verse he is surpassed by few, and his letters are admirable specimens of the epistolary style.

Gray-lag, a popular name for the *Anser ferus*, or common wild goose. See *Goose*.

Grayling, a genus of fishes of the family Salmonidæ. The common grayling (*Thymallus vulgāris*) is found in many English streams, and also in some in Scotland. It



Grayling (*Thymallus vulgāris*).

is scattered over Europe from Lapland to North Italy, and also over part of Asia. The grayling prefers rapid streams where the water is clear and cool, and the bottom sandy or pebbly, and it requires on the whole deeper water than the trout, to which it has a certain similarity in habit. The general colour is yellowish-brown, including the fins; several deeper brown lines run along the body; under the belly white. The colour often varies in different streams. It is a favourite fish of the angler. In N. America there is also a grayling, *T. tricolor*, good for food as well as for sport.

Grays Thurrock, a town of England, Essex, on the Thames, on the railway to Tilbury and Southend. Pop. 12,219.

Graywacke (grā-wak'e), a metamorphic sandstone in which grains or fragments of various minerals, as quartz and felspar, or of rocks, as slate and siliceous clay rocks, are embedded in an indurated matrix, which may be siliceous or argillaceous. The colours are gray, red, blue, or some shade of these. The term, as used by the earlier writers, included all the conglomerates, sandstones, and shales of the older formations, when these had been subjected to considerable change. At first it was nearly synonymous with the Silurian strata, these, especially in Scotland, yielding the only genuine graywacke. The term is now little used.

Grazale'ma, a town of Spain, in Andalusia, province of Cadiz, on a slope at the foot of a sierra, 58 miles E.N.E. of Cadiz. It has a handsome Gothic church. Pop. 8388.

Great Bahama. See *Bahamas*.

Great Bear Lake. See *Bear Lake*.

Great Britain. See the articles *Britain*, *England*, *Scotland*, and *Wales*.

Great Circle Sailing, or TANGENT SAILING, a method of navigating a vessel according to which her course is always kept as nearly as possible on a great circle of the sphere, that is, a circle which has for its centre the centre of the sphere. An arc of such a circle joining two places gives the shortest distance between them, consequently the course of a vessel sailing on this arc will be the shortest possible. A simple instrument called a spherograph is employed for finding the great circle course between places, and this is accompanied by tables compiled for the same purpose.

Great Eastern, an iron steamship, the largest vessel yet constructed, built (1854–58) at Millwall, on the Thames, for the Eastern Steam Navigation Co., by Mr. Scott Russell, from plans by Mr. I. K. Brunel; length, 680 feet; breadth, 82½, or, including paddle-boxes, 118 feet; height, 58 feet (70 to top of bulwarks). She had six masts, five of iron and one of wood, and could spread 7000 yards of sail, besides having eight engines, divided between her screws and paddles, and capable of working at 11,000 horse-power. From the first her career was unfortunate, the launching process alone lasting three months and costing £60,000. After several unremunerative trips to New York she was employed first as a troopship, and then as a cable-laying ship for which her size and steadiness specially qualified her. Various attempts were afterwards made to utilize her, but she at last came to be a mere holiday spectacle, and was broken up in 1888.

Great Fish River, a river of South-east Africa, near the eastern frontier of Cape Colony. It rises in the Snowy Mountains,

and falls into the sea after a course of 230 miles.

Great Fish or **Back River**, a river of Northern Canada, rising in Sussex Lake, and flowing, after a course of about 500 miles, into Cockburn Bay, an inlet of the Arctic Ocean; discovered by Sir George Back.

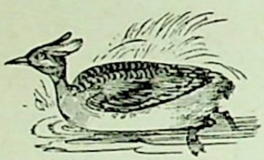
Great Marlow, a town of England, counties Bucks and Berks, on the Thames, 5 miles N.N.W. of Maidenhead. Manufactures, chairs, lace, and paper. Pop. (par.) 5283.

Great Salt Lake, a lake, United States, State of Utah, 4000 feet above sea-level, 70 miles in length north to south and 48 miles east to west. Five gallons of its water yield, by evaporation, 14 pints of salt. It has several islands, which, with its shores, are whitened by the salt: and it receives the Bear, the Utah, and several other streams. It contains no fish, but has several species of insects and a crustacean, and is frequented by immense flocks of gulls, ducks, geese, and swans.

Great Slave Lake. See *Slave Lake.*

Greaves, armour worn on the front of the lower part of the legs, across the back of which it was buckled.

Grebe, the common name of the birds of the genus *Podiceps*, family Colymbidæ, characterized by a straight conical bill, no tail, tarsus short, toes flattened, separate, but broadly fringed at their edges by a firm



Horned Grebe (*Podiceps cornūtus*).

membrane, and legs set so far back that on land the grebe assumes the upright position of the penguin. The geographical distribution of the genus is very wide, these birds haunting seas as well as ponds and rivers. They are excellent swimmers and divers; feed on small fishes, frogs, crustaceans, and insects; and their nests, formed of a large quantity of grass, &c., are generally placed among reeds and sedges, and rise and fall with the water. Five species are British, the great crested grebe (*P. cristātus*), the little grebe or dabchick (*P. minor*), the Sclavonian or horned grebe (*P. cornūtus*), the red-neck (*P. rubricollis*), and the rare eared-grebe (*P. aurītus*). The three last are winter visitors, but the two first remain all the year. Nine species are N. American, some of them (crested grebe, horned grebe) being the same as those of Europe. The great crested grebe is about 21 to 22 inches long, and has been called satin grebe from its beautiful silvery breast-plumage, much esteemed as material for ladies' muffs.

Greece, a country, now a kingdom, of South-eastern Europe, the earliest portion of this continent to attain a high degree of civilization, and to produce works of art and literature as yet unsurpassed. It forms the southern extremity of what is called the Balkan Peninsula, and itself partly consists of a well-marked peninsula, the Morea or Peloponnesus, united to Northern Greece by the Isthmus of Corinth. The name Greece (Latin, *Græcia*) is of Roman origin, the native name for the country being *Hellas*, and the people calling themselves *Hellēnes.* Anciently Hellas was used in a wider sense, so as to include both Greece itself and all countries that had become Greek by colonization. Modern Greece is separated from Turkey on the north by a winding, mostly artificial, boundary extending from the Gulf of Arta on the west to the Gulf of Salonica on the east, and comprising rather less than ancient Greece, which also took in part of what is now Albania. Ancient Greece was divided into a number of independent states or territories, namely, in Northern Greece, Thessaly, Epirus (not in the modern kingdom), Locris, Phocis, Bœotia, Ætolia, Acarnania, Attica, Megaris; in the Peloponnesus, Corinth, Argolis, Achaia, Elis, Messenia, Laconia (Sparta), and Arcadia, the last entirely inland. These names are still kept up, but the country is now divided into nomes, or *nomarchies*, some of which are formed of the Greek islands, namely, Eubœa, Corfu, Cephalonia, Zante, and the Cyclades. The total area is 25,014 sq. miles; the population 2,187,208.

Physical Features.—Greece proper is remarkable for the extent of its coast-line, formed by numerous gulfs which penetrate into it in all directions. The largest, the Corinthian Gulf, or Gulf of Lepanto, on the east, and the Saronic Gulf, or Gulf of Ægina, on the west, which nearly meet at the Isthmus of Corinth, separate Northern Greece from the Morea. Another striking feature is the mountainous character of the interior. On the north are the Cambunian Mountains, with Mount Olympus (9754 ft.) at their eastern extremity. From

this range a lofty chain, called Mount Pindus, runs southwards almost parallel to the eastern and western coasts of Greece. At a point in this chain called Mount Tymphrestus or Typhrestus (Mount Velukhi) two chains proceed in an easterly direction, the northern being called Mount Othrys, the southern terminating at Thermopylæ, Mount Œta (8240 ft.). The Cambunian Mountains, Pindus and Othrys, inclose the fertile vale of Thessaly, forming the basin of the Peneus (Salambria), and the ranges of Othrys and Œta inclose the smaller basin of the Sperchius (Hellada). Another range, that of Parnassus (highest summit 8068 ft.), branches off from Mount Œta and runs still more to the south. The peaks of Cithæron, Parnes, Pentelicus, and Hymettus lie in the same direction, and the range in which they are found is continued to the south-east point of continental Greece. This range on the south and that of Œta on the north inclose the basin of the Cephissus, with Lake Copais. The chief rivers on the west side of the Pindus chain are the Arachthus (Arta) and the Achelōus (Aspropotamo). The chief feature in the mountain system of the Peloponnesus is a range or series of ranges forming a circle round the valley of Arcadia in the interior, having a number of branches proceeding outward from it in different directions. The highest range in the Peloponnesus, Mount Taygetus (7904 feet), branches off from the circle round Arcadia, strikes southwards, and terminates in the promontory of Tænarum (Cape Matapan). The chief rivers in the Peloponnesus are the Eurotas (Basilipotamo), the Alpheus (Ruphia), draining Arcadia and Elis; and the Peneus, draining Elis. The rock most largely developed in the mountains of Greece is limestone, which often assumes the form of the finest marble. Granite occurs in patches. Tertiary formations prevail in the north-east of the Peloponnesus; and in the north-west, along the shores of Elis, are considerable tracts of alluvium. Silver, lead, zinc, and copper are found and worked to some extent, the famous ancient silver mines of Laurium in Attica still yielding a little of the precious metal.

Climate.—The climate is generally mild, in the parts exposed to the sea equable and genial, but in the mountainous regions of the interior sometimes very cold. None of the mountains attain the limit of perpetual snow; but several retain it far into the summer. In general the first snow falls in October and the last in April. During summer rain scarcely ever falls, and the channels of the minor streams become dry. Towards the end of harvest rain becomes frequent and copious; and intermittent fevers, &c., become common. In ancient times, when the country was more thickly peopled and better cultivated, the climate seems to have been better.

Vegetation, Agriculture, &c.—Greece is mainly an agricultural country, though agriculture is in a somewhat backward state. The land is largely held by peasant proprietors. The principal crops are wheat, barley, and maize. The cultivated land produces all the fruits of the latitude—figs, almonds, dates, oranges, citrons, melons, &c. The vine also grows vigorously, as it did in ancient Greece. But a much more important product of Greece, especially on the coasts of the Peloponnesus, and in the islands of Cephalonia, Zante, Ithaca, and Santa Maura, is the Corinthian grape or currant. The olive is also largely grown (as in ancient times), and the culture of the mulberry, for the rearing of silk-worms, has recently been greatly extended. The extensive forests contain among other trees a peculiar kind of oak (*Quercus Ægilops*), which yields the valonia of commerce. The domestic animals are neither numerous nor of good breeds. Asses are almost the only beasts of burden employed; and dairy produce is obtained from the sheep and the goat.

Manufactures, Trade, Communications, &c.—The manufactures are extremely limited, but with all other branches of industry in Greece are increasing. They include cottons, woollens, earthenware, leather, &c.; and ship-building is carried on largely at various points of the coast, and at the Piræus. The merchant marine of Greece has an aggregate burden of about 383,000 tons. A large part of the shipping of Greece is engaged in the carrying trade between Britain, Germany, &c., and Greece, Turkey, and other Mediterranean countries. The chief ports are Corfu, Syra, Piræus (the port of Athens), and Patras. The principal exports are currants and olive-oil; but valonia, emery, silk, dried figs, raisins, honey, wax, lead, tobacco, and other articles are also exported; the principal imports are cereals, and cotton, woollen, and silk goods, sugar, iron goods, coffee, &c. The greatest hindrance to the development of Greece at the present time is the want of good roads, but

this is being gradually remedied. A canal across the Isthmus of Corinth was completed in 1893. In 1883 there were only 58 miles of railways open, but in 1894 there were 560 miles opened, and 300 miles constructing. The telegraph lines were of a total length of 4800 miles. The money unit of Greece is the *drachma* of 100 *lepta*, which is nominally 1 franc.

Constitution, &c.—According to the present constitution the throne is hereditary in the family of King George (second son of the King of Denmark). The legislative authority is vested in a single chamber, called the Boulē, the members of which (proportioned in number to the amount of the population) are elected for four years by ballot by manhood suffrage. The executive power rests with the king and ministry. The Greek Church alone is established, but all forms of religion enjoy toleration. Justice is administered, on the basis of the French civil code, by a supreme court (*Areios Pagos*), at Athens; four royal courts (*Ephiteia*), at Athens, Nauplia, Patras, and Corfu; sixteen courts of primary resort (*Protodokeia*), one in each principal town. The public revenue, derived chiefly from customs, land tax, tobacco and petroleum monopoly, state domains and national property, &c., was estimated for 1895 at £3,738,000, and the expenditure at much the same. Greece has a large public debt, the estimated total being £28,000,000. All able-bodied males are liable to military service during a term of nineteen years, of which in the infantry one year and in special corps two years must be spent with the colours, the remainder in the reserve and in the landwehr or militia. In 1895 the total nominal strength of the army was 24,877. The navy consisted of five ironclads (three of them of some fighting power), and a number of other vessels. Several vessels are being added.

People.—The ancient Greeks were an Aryan race, probably most closely akin to the Italian peoples. They were noted for physical beauty and intellectual gifts. The present population contains a considerable intermixture of foreign stocks, among which the Albanese, or Arnauts, are the most numerous; but the great majority, though not without some taint in their blood, are of Greek extraction. While the population of Greece proper is not more than 2,200,000, the whole Greek nationality reaches nearly 8,000,000, of whom 3,500,000 are found in European Turkey and 2,000,000 in Asia Minor. Education in Greece is free and compulsory in theory (from the age of five to twelve), but a large proportion of the people can neither read nor write. There are three grades of schools, the primary national schools, the Hellenic or secondary grammar-schools, and the gymnasia, which are higher grammar-schools or colleges. In addition there is a university at Athens. The national dress of the Greeks resembles the Albanian costume. In the men it consists of a tight jacket, generally scarlet, wide trousers descending as far as the knee, and embroidered gaiters; in the women it consists of a vest fitting close to the shape, and a gown flowing loosely behind.

History.—The earliest inhabitants of Greece were the Pelasgians, of whom little or nothing is known with certainty. To them are attributed certain remains of ancient buildings, especially the so-called Cyclopean works in the Peloponnesus. The Pelasgians were succeeded by the Hellenes, or Greeks proper, who may have been simply one of the Pelasgian tribes or races. To the early period of the Hellenic occupation of Greece belong the legends of the Trojan War, of Theseus, of Jason and the Argonauts, &c. The Hellenes were divided into four chief tribes—the Æolians, occupying the northern parts of Greece (Thessaly, Bœotia, &c.); the Dorians, occupying originally a small region in the neighbourhood of Mount Œta; the Achæans, occupying the greater part of the Peloponnesus; and the Ionians, occupying the northern strip of the Peloponnesus and Attica. Of the four principal tribes the Ionians were most influential in the development of Greece. The distribution of the Hellenic tribes was greatly altered by the Dorian migration, sometimes called 'the return of the Heracleidæ' (descendants of Hercules), placed by Thucydides about eighty years after the fall of Troy, or about B.C. 1104, according to the ordinary chronology. Before the great migration several smaller ones had taken place, causing considerable disturbance; and at last the hardy Dorian inhabitants of the mountainous region about Mount Œta conquered a large part of northern Greece, and then entered and subdued the greater part of the Peloponnesus, driving out or subjugating the Achæans, as the Achæans had the Pelasgians. In the legend the Dorians are represented as having entered the Peloponnesus under Temenus, Cresphontes, and Aristodemus, three descendants of Heracles (Her-

cules), who had come to recover the territory taken from their ancestors by Eurystheus. Of the Achæan inhabitants of the Peloponnesus a large section occupied the territory formerly in possession of the Ionians, henceforward called Achaia. The Ionians driven out of the Peloponnesus found at first a refuge among their kindred in Attica, but owing to its limited territory were soon compelled to leave it and found Ionic colonies on several of the islands of the Ægean Sea and on the middle part of the coast of Asia Minor, where they built twelve cities, latterly forming an Ionic Confederacy. The principal of these were Ephesus and Miletus. About the same time another body of Greeks, from Thessaly and Bœotia, are said to have founded the Æolian colonies on some of the northern islands of the Ægean, and on the northern part of the western coast of Asia Minor. The Æolic colonies of Asia Minor also formed a confederacy of twelve cities, afterwards reduced to eleven by the accession of Smyrna to the Ionic Confederacy. The southern islands and the southern part of the west coast of Asia Minor were in like manner colonized by Dorian settlers. The six Doric towns in Asia Minor, along with the island of Rhodes, formed a confederacy similar to the Ionic and Æolic ones.

In course of time many Greek settlements were made on the coasts of the Hellespont, the Propontis (Sea of Marmora), and the Black Sea, the most important being Byzantium (Constantinople), Sinope, Cerasus, and Trapezus (Trebizonde). There were also flourishing Greek colonies on the coasts of Thrace and Macedonia; for example, Abdera, Amphipolis, Olynthus, Potidæa, &c.; and the Greek colonies in Lower Italy were so numerous that the inhabitants of the interior spoke Greek, and the whole region received the name of Greater Greece (Magna Græcia). The most famous of the Greek colonies in this quarter were Tarentum, Sybaris, Croton, Cumæ, and Neapolis (Naples). Sicily also came to a great extent into the hands of the Greeks, who founded on it or enlarged many towns, the largest, most powerful, and most highly cultured of the Greek colonies here being the Corinthian colony of Syracuse, founded in the eighth century B.C. Other important colonies were Cyrene on the north coast of Africa, and Massilia (Marseilles) on the south coast of Gaul. All these colonies as a rule preserved the customs and institutions of the mother city, but were quite independent.

Although ancient Greece never formed a single state, the various Greek tribes always looked upon themselves as one people, and classed all other nations as *Barbaroi* (foreigners). There were four chief bonds of union between the Greek tribes. First and chiefly they had a common language, which, despite its dialectic peculiarities, was understood throughout all Hellas or the Greek world. Secondly, they had common religious ideas and institutions, and especially, in the oracle of Delphi, a common religious sanctuary. Thirdly, there was a general assembly of the Greeks, the Amphictyonic League, in which the whole people was represented by tribes (not by states), and the chief functions of which were to guard the interests of the sanctuary of Delphi, and to see that the wars between the separate states of Greece were not too merciless. The fourth bond consisted in the four great national festivals or games, the Olympian, Isthmian, Nemean, and Pythian, on the first of which the whole of Greece based its calendar.

The various separate states of Greece may be divided, according to the form of their constitution, into the two great classes of aristocratic and democratic. Sparta or Lacedæmon, the chief town of Laconia and of the Doric tribe, was the leading aristocratic state; and Athens, the capital of Attica and the chief town of the Ionic tribe, was the leading democratic state; and as a rule all the Doric states, and subsequently all those under the influence of Sparta, resembled that city in their constitution; and all the Ionic states, and those under the influence of Athens, resembled it. These two tribes or races are the only ones that come into prominence during the earlier part of Greek history subsequent to the Doric migration. Sparta is said to have derived its form of government, and all its institutions, in the ninth century B.C., from Lycurgus, whose regulations developed a hardy and warlike spirit among the people, the results of which were seen in their conquests over surrounding states, especially over the Messenians in the eighth and seventh centuries B.C.

The constitution of Athens appears from the legends of Theseus and Codrus to have been at first monarchical, and afterwards aristocratic, and to have first received a more or less democratic character from Solon at the beginning of the sixth century B.C. This was followed about fifty years later by a monarchical usurpation under Pisistratus,

and his sons Hippias and Hipparchus, the last survivor of whom, Hippias, reigned in Athens till 510 B.C. After the expulsion of Hippias the republic was restored, under the leadership of Cleisthenes, in a more purely democratic form than at first. A brief struggle with the Spartans, whose aid was invoked by some of the nobles, now took place, and Athens emerged from it well prepared for the new danger which threatened Greece.

The Greek colonies in Asia Minor and the adjacent islands, after being conquered by Crœsus, king of Lydia, fell with the fall of Crœsus into the power of Cyrus, king of Persia. In B.C. 500, however, the Ionians revolted with the assistance of the Athenians and Eretrians, and pillaged and burned Sardis. The rebellion was soon crushed by Darius, who destroyed Miletus, and prepared to invade Greece. In 492 he sent an expedition against the Greeks under his son-in-law Mardonius, but the fleet which carried his army was destroyed in a storm off Mount Athos. A second army, under the command of Datis and Artaphernes, landed on Eubœa, and after destroying Eretria, crossed the Euripus into Attica; but it was totally defeated in B.C. 490 on the plain of Marathon by 10,000 Athenians and 1000 Platæans, under Miltiades. In the midst of preparations for a third expedition Darius died, leaving his plans to be carried out by his son Xerxes, who, with an army of 1,700,000 men, crossed the Hellespont in 481 by means of two bridges of boats, and marched through Thrace, Macedonia, and Thessaly, while his fleet followed the line of coast. In the pass of Thermopylæ he was held in check by Leonidas with 300 Spartans and 700 Thespians; but the small band was betrayed and annihilated (480 B.C.); and the way through Phocis and Bœotia being now open he advanced into Attica, and laid Athens in ruins. The deliverance of Greece was chiefly due to the genius and courage of Themistocles. The united fleet of the Greeks had already contended with success against that of the Persians off Artemisium, and had then sailed into the Saronic Gulf, followed by the enemy. Themistocles succeeded in inducing the Persians to attack in the narrow strait between Attica and Salamis, and totally defeated them.

From a neighbouring height Xerxes himself witnessed the destruction of his fleet, and at once began a speedy retreat with his land army through Thessaly, Macedonia, and Thrace, leaving behind him 300,000 men in Thessaly. In the spring of the following year (479) these advanced into Attica and compelled the citizens once more to seek refuge in Salamis; but were so completely defeated at Platæa by the Greeks under Pausanias, that only 40,000 Persians reached the Hellespont. On the same day the remnant of the Persian fleet was defeated by the Greeks off Mount Mycale.

The brilliant part taken by the Athenians under Themistocles in repelling this invasion of Athens greatly increased her influence throughout Greece. From this date begins the period of the leadership or *hegemony* of Athens in Greece, which continued to the close of the Peloponnesian war, 404 B.C. The first thing which Athens exerted her influence to effect was the formation of a confederacy, including the Greek islands and maritime towns, to supply means for the continuance of the war by payments into a common treasury established on the island of Delos, and by furnishing ships. In this way Athens gradually increased her power so much that she was able to render tributary several of the islands and smaller maritime states. In 469 B.C. the series of victories won by the Athenians over the Persians was crowned by the double victory of Cimon over the Persian fleet and army on the Eurymedon, in Asia Minor, followed by the Peace of Cimon, which secured the independence of all Greek towns and islands. Shortly after followed the brilliant administration of Pericles, during which Athens reached the height of her grandeur.

The position of Athens, however, and the arrogance and severity with which she treated the states that came under her power made her many enemies. In the course of time two hostile confederacies were formed in Greece, one consisting of Athens and the democratic states of Greece; the other of Sparta and the aristocratic states. At last, in 431, war was declared by Sparta on the complaint of Corinth that Athens had furnished assistance to Corcyra in its war against the mother city; and on that of Megara, that the Megarean ships and merchandise were excluded from all the ports and markets of Attica; and thus began the Peloponnesian war which for twenty-seven years devastated Greece.

In the first part of the war the Spartans, who invaded Attica in 431 B.C. and three times in the five years following, had considerable successes, which were aided by

the pestilence that broke out at Athens and the death of Pericles. In 425, however, Pylos was captured by the Athenian general Demosthenes, and the Spartan garrison on the island of Sphacteria was compelled to surrender to Cleon. Soon after Cythera fell into the hands of the Athenians, but they were defeated in Bœotia at Delium (424) and at Amphipolis in Thrace by Brasidas in 422, when both Cleon and Brasidas were killed. The Peace of Nicias (421 B.C.), which followed the death of Cleon, brought disaffection into the Spartan Confederacy, the Corinthians endeavouring with Argos and Elis to wrest from Sparta the hegemony of the Peloponnesus. In this design they were supported by Alcibiades; but Sparta was victorious at the battle of Mantinea in 418. Soon after this the Athenians resumed hostilities, fitting out in 415 B.C. a magnificent army and fleet, under the command of Alcibiades, Nicias, and Lamachus, for the reduction of Syracuse. Alcibiades, however, being subsequently deprived of his command on a charge of impiety, betook himself to Sparta, and exhorted the city to renew the war with Athens. By his advice one Spartan army was despatched to Attica, where it took up such a position as prevented the Athenians from obtaining supplies from Eubœa, while another was sent under Gylippus to assist their kindred in Sicily. These steps were ruinous to Athens. The Athenian army and fleet at Syracuse were completely destroyed, and though the war was maintained with spirit the prestige of Athens was seriously diminished. Many of her allies joined Sparta, and a revolution and brief change of government tended still further to weaken her. Still she made not unsuccessful efforts to regain her position, conquered the revolted towns about the Bosphorus, and defeated the Spartan admiral Callicratidas off the islands of Arginusæ in 406. Sparta, however, was now in receipt of Persian aid, and Lysander, having captured nearly the whole Athenian fleet at Ægospotamos (405), retook the towns of Asia Minor, surrounded Athens, and blocked the Piræus. In 404 B.C. the Athenians were starved into surrender, the fortifications were destroyed, and an aristocratic form of government established by Sparta, placing the supreme power in the hands of thirty individuals, commonly known as the Thirty Tyrants. Only a year later, however (403), Thrasybulus was able to re-establish the democracy.

The period which follows the fall of Athens is that of Sparta's leadership or hegemony in Greece, which lasted till the battle of Leuctra, in 371 B.C. The Spartan rule was not more liked than that of Athens, and the character of the Spartan state itself, with its increase of wealth and power, underwent great change. To escape the stigma of having ceded the cities of Asiatic Greece to Persia, Agesilaus was sent to retake them, but was defeated by the fleet of Pharnabazus under Conon the Athenian; and the states of Greece, the Spartans included, at last, in 387, agreed to the disgraceful Peace of Antalcidas, by which the whole west coast of Asia Minor was ceded to the Persians. An act of violence committed by a Spartan general in garrisoning Thebes in 380, was the commencement of the downfall of Sparta. The Thebans revolted under Pelopidas and Epaminondas, and the Spartans on invading Bœotia were so completely defeated at Leuctra in 371 B.C. that they never fully recovered from the blow. With this victory Thebes won the leading place in Greece, which she maintained during the lifetime of Epaminondas, whose influence was paramount in the Peloponnesus. Epaminondas fell in defeating the Spartans and Arcadians near Mantinea in 362, and his death reduced once more the authority of Thebes in Greece.

Two years after the death of Epaminondas Philip, the father of Alexander the Great, became king of Macedonia. An occasion for interference in the affairs of Greece was furnished him by the war known as the Sacred war (355–346), arising from the Phocians having taken possession of some of the land belonging to the sanctuary of Delphi. The Phocians were besieged by the Thebans, who called in the aid of Philip of Macedon, who was accorded the place till then held by the Phocians in the Amphictyonic League. It was not, however, till the Locrian war (339–338) that Philip acquired a firm hold in Greece. The Locrians had committed the same offence as the Phocians, and Philip, as one of the members of the league, received the charge of punishing them. The real designs of Philip soon became apparent, and the Athenians, on the advice of Demosthenes, hastily concluded an alliance with the Thebans, and sent an army to oppose him. The battle of Chæronea which ensued (338) turned out, however, disastrously for the allies, and Philip became master of Greece. He then

collected an army for the invasion and conquest of the rotten empire of Persia, and got himself declared commander-in-chief by the Amphictyonic League at Corinth in 337 B.C.; but before he was able to start he was assassinated, B.C. 336.

The design of Philip was taken up and carried out by his son Alexander the Great, during whose absence Antipater was left behind as governor of Macedonia and Greece. Soon after the departure of Alexander, Agis III. of Sparta headed a rising against Antipater, but was defeated at Megalopolis in 330 B.C., and no other attempt was made by the Greeks to recover their liberty for nearly a hundred years. At the close of the wars which followed the death of Alexander, and which resulted in the division of his empire, Greece remained with Macedonia.

The last efforts of the Greeks to recover their independence proceeded from the Achæans, who though frequently mentioned by Homer as taking a prominent part in the Trojan war, had for the most part kept aloof from the quarrels of the other states, and did not even furnish assistance to repel the Persian invasion. They had taken part, though reluctantly, in the Peloponnesian war on the side of Sparta, and had shared in the defeat of Megalopolis in B.C. 330. In the course of the first half of the third century B.C. several of the Achæan towns expelled the Macedonians, and revived an ancient confederacy, which was now known as the Achæan League. Aratus of Sicyon became its leading spirit. It was joined also by Corinth, and even by Athens and Ægina. The Spartans, however, who had maintained their independence against Macedonia, naturally looked with jealousy on the efforts of Aratus, and during the reign of Cleomenes a war broke out between Sparta and the Achæan League. The league was at first worsted, and was only finally successful when Aratus sacrificed the ultimate end of the league by calling in the aid of the Macedonians. In the battle of Sellasia (222 B.C.) Cleomenes was defeated, and the Macedonians became masters of Sparta. Aratus died in 213, and his place was taken by Philopœmen, 'the last of the Greeks,' who succeeded in making the league in some degree independent of Macedonia.

About this time the Romans, who had just come out victorious from a second war with Carthage, found occasion to interfere in the affairs of Greece. Philip V. of Macedon having allied himself with Hannibal, the Romans sent over Flamininus to punish him, and in this war with Philip the Romans were joined by the Achæan League. Philip was defeated at Cynoscephalæ in 197 B.C., and was obliged to recognize the independence of Greece. The Achæan League thus became supreme in Greece, having been joined by all the states of the Peloponnesus. But the league itself was in reality subject to Rome, which found constant ground for interference until 147 B.C., when the league openly resisted the demand of the senate, that Sparta, Corinth, Argos, and other cities, should be separated from it. In the war which ensued, which was concluded in 146 B.C. by the capture of Corinth by the Roman consul Mummius, Greece completely lost its independence, and was subsequently formed into a Roman province.

On the division of the Roman Empire Greece fell of course to the eastern or Byzantine half. From 1204 to 1261 it formed a part of the Latin Empire of the East, and was divided into a number of feudal principalities. In the latter year it was reannexed to the Byzantine Empire, with which it remained till it was conquered by the Turks between 1460 and 1473. In 1699 the Morea was ceded to the Venetians, but was recovered by the Turks in 1715. From 1715 till 1821 the Greeks were without intermission subject to the domination of the Turks. In 1770, and again in 1790, they made vain attempts at insurrection, but in 1821 Ali, the pasha of Janina, revolted against the sultan Mahmoud II., and secured the aid of the Greeks by promising them their independence. The rising of the Greeks took place on the 6th of March, under Alexander Ypsilanti, and on the 1st of January, 1822, they published a declaration of independence. In the same year Ali was assassinated by the Turks, but the Greeks, encouraged by most of the European nations, continued the struggle under various leaders, of whom the chief were Marcos Bozzaris, Capo d'Istria, Constantine Kanaris, Kolocotroni, &c. In 1825 the Turks, with the aid of Ibrahim Pasha, took Tripolitza, the capital of the Morea, and Missolonghi, and though Lord Cochrane organized the Greek fleet, and the French colonel Fabvier their army, the Turks continued to triumph everywhere. A treaty was then concluded at London (July 6, 1827) between Britain, France, and Russia, for the pacification of Greece, and when the mediation of these three powers was de-

clined by the sultan, their united fleets, under Admiral Codrington, annihilated the Turkish fleet off Navarino, Oct. 20, 1827. In the beginning of the following year (1828) Count Capo d'Istria became president of the state, and later on in the same year Ibrahim Pasha was forced to evacuate Greece. At last, on the 3d of February, 1830, a protocol of the allied powers declared the independence of Greece, which was recognized by the Porte on the 25th April of this year. The crown was offered to Leopold, prince of Saxe-Coburg, and when he refused it, to Otho, a young prince of Bavaria, who was proclaimed king of the Hellenes at Nauplia in 1832. But his arbitrary measures, and the preponderance which he gave to Germans in the government, made him unpopular, and although after a rebellion in 1843 a constitution was drawn up, he was compelled by another rebellion in 1862 to abdicate. A provisional government was then set up at Athens, and the National Assembly offered the vacant throne in succession to Prince Alfred of England and Prince William George of Denmark. The latter accepted it, and on March 30, 1863, was proclaimed as King George I. In 1864 the Ionian Islands, which had hitherto formed an independent republic under the protection of Britain, were annexed to Greece.

From the first Greece has sought an opportunity of extending its frontier northwards, so as to include the large Greek population in Thessaly and Epirus. In January 1878, after the fall of Plevna, Greek troops were moved into Thessaly and Epirus, but were withdrawn on the remonstrance of Britain. The promises held out to Greece by the Berlin congress were in danger of being withdrawn, but the persistence of Greece led in 1881 to the cession to her of Thessaly and part of Epirus. The union of Eastern Roumelia with Bulgaria, in 1885, gave rise to fresh demands, and war with Turkey was only prevented by the great powers. In 1897 an insurrection in Crete led to the interference of the Greeks and to war with Turkey, the result being the speedy defeat of Greece, entailing the payment of a heavy war indemnity with some loss of territory on the Thessalian frontier.

Religion of Ancient Greece.—The religion of the ancient Greeks was polytheism, there being a great number of divinities, many of whom must be regarded as personifications of natural powers, or of phenomena of the external world, personified sentiments, &c. Thus there were gods corresponding to Earth and Heaven, the Ocean, Night, &c. The Romans, when they became acquainted with the literature and religion of the Greeks, identified the Greek deities with those of their own pantheon. In this way the Greek and Roman deities came to be confounded together, and the names of the latter even came to supersede those of the former. The supreme ruler among the gods was Zeus (Roman Jupiter or Juppiter), the son of Kronos (Roman Saturn), who after the subjugation of the Titans and Giants ruled in Olympus, while his brother Pluto reigned over the lower world (Hades, Tartarus), and Poseidon (Neptune) ruled in the sea. Like reverence was paid to Hēra (Juno), the sister and wife of Zeus, and the queen of Heaven; to the virgin Pallas Athēnē (Minerva); to the two children of Lētō (Latona), namely, Apollo, the leader of the Muses, and his sister the huntress Artĕmis (Diana), the goddess of the moon; to the beautiful daughter of Zeus, Aphrodītē (Venus), the goddess of love; to Arēs (Mars), the god of war, Hermēs (Mercury), the herald of the gods, and others besides. In addition to these there was an innumerable host of inferior deities (Nymphs, Nereids, Tritons, Sirens, Dryads and Hamadryads, &c.) who presided over woods and mountains, fields and meadows, rivers and lakes, the seasons, &c. There was also a race of heroes or demigods (such as Heracles or Hercules, Perseus, &c.) tracing their origin from Zeus, and forming a connecting link between gods and men, while on the other hand the Satyrs formed a connecting link between the race of men and the lower animals.

With regard to the inculcation of religious beliefs the Greeks had no separate class appointed to perform these functions. The priests were in no sense preachers of doctrines, but merely hierophants, or exhibitors of sacred things, of rites, symbols, and images. They showed how a god was to be worshipped; but it was not their office to teach theological doctrine, or even as a rule to exhort to religious duty. The true teachers of the Greek religion were the poets and other writers, and it is to the hymns, epics, dramas, and histories of the Greeks that we must turn in order to learn how they regarded the gods. No degree of consistency is to be found in them, however, the personality and local origin of the writers largely moulding their views. A belief in

the justice of the gods as manifested in the punishment of all offences against them was cardinal. The man himself might escape, but his children would suffer, or he might be punished in a future state—the latter view being less commonly held than the former of an entailed curse. The gods are also represented by the Greeks as holy and truthful, although they are in innumerable other passages described as themselves guilty of the grossest vices, and likewise as prompting men to sin, and deceiving them to their own destruction. In their general attitude towards men the gods appear as inspired by a feeling of envy or jealousy. Hence they had constantly to be appeased, and their favour won by sacrifices and offerings. Certain classes were, however, under the peculiar protection and favour of the gods, especially strangers and suppliants. The Greeks believed that the gods communicated their will to men in various ways, but above all, by means of oracles, the chief of which were that of Apollo at Delphi, and that of Zeus at Dodona. Dreams ranked next in importance to oracles, and divination by birds, remarkable natural phenomena, sneezing, &c., was practised. The Greeks appear to have had at all times some belief in a future existence, but in the earliest times this belief was far from being clearly defined.

Greek Language.—The Greek language belongs to the Indo-European group, and is thus a sister of the Sanskrit, Latin, Teutonic, and Celtic tongues. It is customary to distinguish three leading dialects according to the three leading branches of the Greeks, the Æolic, the Doric, and the Ionic, to which was afterwards added the mixed Attic dialect; besides these there are several secondary dialects. Akin to the Ionic is the so-called Epic dialect, that in which the poems of Homer and Hesiod are written, and which was afterwards adopted by other Epic writers. The Doric was hard and harsh; the Ionic was the softest. The Æolic was spoken on the north of the Isthmus of Corinth (except in Megara, Attica, and Doris), in the Æolian colonies of Asia Minor, and on some of the northern islands of the Ægean Sea. The Doric was spoken in the Peloponnesus, in Doris, in the Doric colonies of Asia Minor, of Lower Italy (Tarentum), of Sicily (Syracuse, Agrigentum); the Ionic in the Ionian colonies of Asia Minor, and on the islands of the Archipelago; and the Attic in Attica. In each of these dialects there are celebrated authors. The Ionian dialect is found pure in Herodotus and Hippocrates. The Doric is used in the poems of Pindar, Theocritus, Bion, and Moschus. In Æolic we have fragments of Alcæus and Sappho. After Athens had obtained the supremacy of Greece, and rendered itself the centre of all literary cultivation, the master-pieces of Æschylus, Sophocles, Euripides, Aristophanes, Thucydides, Xenophon, Plato, Aristotle, Isocrates, Demosthenes, &c., made the Attic the common dialect of literature. Grammarians afterwards distinguished the genuine Attic, as it exists in those masters, from the Attic of common life, calling the latter the *common Greek* or *Hellenic* dialect. In this latter dialect wrote Theophrastus, Apollodorus, Polybius, Plutarch, and others. Many later writers, however, wrote genuine Attic, as Lucian, Ælian, and Arrian. Except the dramatists, the poets by no means confined themselves to the Attic; the dramatists themselves assumed the Doric, to a certain degree, in their choruses, and the other poets retained the Homeric style, which was a congeries of forms occurring as peculiarities in the various dialects.

At what time this language first began to be expressed in writing has long been a subject of doubt. According to the usual account Cadmus the Phœnician introduced the alphabet into Greece; and it is an undoubted fact that the most of the Greek letters are derived from the Phœnician ones. The Greek alphabet possesses the following twenty-four letters:—A, α (alpha), *a*; B, β (beta), *b*; Γ, γ (gamma), *g*; Δ, δ (delta), *d*; E, ϵ (epsilon), *ĕ*; Z, ζ (zeta), *z*; H, η (eta), *ē*; Θ, θ, ϑ (theta), *th*; I, ι (iota), *i*; K, κ (kappa), *k*; Λ, λ (lambda), *l*; M, μ (mu), *m*; N, ν (nu), *n*; Ξ, ξ (xi), *x*; O, o (omicron, *i.e.* small *o*), *ŏ*; Π, π (pi), *p*; P, ρ (rho), *r*; Σ, σ, ς (sigma), *s*; T, τ (tau), *t*; Υ, υ (upsilon), *u*, commonly transliterated by *y*; Φ, φ (phi), *ph*; X, χ (chi), *ch* guttural (as in Scotch *loch*); Ψ, ψ (psi), *ps*; Ω, ω (omega, or great *o*), *ō*. The alphabet originally introduced into Greece is said to have consisted of but sixteen letters; Θ Ξ Φ X Z H Ψ Ω being of later introduction.

Modern Greek, as spoken by the uneducated classes, is called Romaic, from the fact that those who speak it considered themselves before the descent of the Turks upon Europe as belonging to the Roman Empire, and hence called themselves *Romaioi*, or Romans. The Greek of the educated classes, that used in the newspapers and other

literature of the present day, is distinguished from it by a greater resemblance to the Greek of antiquity, which renders it easy for any one who has a satisfactory acquaintance with ancient Greek to read the modern literary Greek. Besides the foreign words introduced into modern Greek, many words have changed their original signification. The grammar has also undergone considerable modification. For example, the numbers have been reduced to two by the suppression of the dual; and the cases to four by the disappearance of the dative, which is now expressed by a preposition with the accusative. The first cardinal numeral is now used as an indefinite article. The degrees of comparison are sometimes expressed by the use of *pleon* (more). The past and future tenses are formed by the aid of the verbs *echō* (I have), and *thelō* (I will). The infinitive mood has its place supplied by a periphrasis with the verb in the subjunctive, and the middle voice has disappeared. The ancient orthography is still preserved, but the vowels η, ι, and υ, and the diphthongs $\epsilon\iota$, $o\iota$, $\upsilon\iota$, are all pronounced like *ee* in English *seen*; β is now pronounced as *v*, and the sound of *b* is expressed by $\mu\pi$; Δ is pronounced like *th* in *thus*, and θ like *th* in *think*.

Greek Literature.—The commencement of extant Greek literature is to be found in the two epic poems attributed to Homer, the Iliad and the Odyssey, which it is commonly believed took shape on the Ionian coast or its islands somewhere between 950 and 850 B.C., and came thence to Greece proper (but see *Homer*). The former deals directly with the Trojan war, the latter describes the wanderings of Ulysses in returning from it. Another poem, of a humorous character, the Batrachomyomachia, or Battle of the Frogs and Mice, one of the first and best of parodies, was also ascribed to Homer, but on altogether insufficient grounds, being of comparatively recent origin. In European Greece there appeared about the middle of the 9th century, at Ascra in Bœotia, the poet Hesiod, who stood at the head of another epic school. Of the sixteen works attributed to him there have come down to us the Theogony or Origin of the Gods, the Shield of Heracles (a fragment of a larger poem of later authorship), and, most important of all, the Works and Days, a didactic work on agriculture. The works of Homer and Hesiod constituted in a certain degree the foundation of youthful education among the Greeks. The Homeric and Hesiodic schools begin to meet in the Homeric hymns composed by different hands between 750 and 500 B.C. Next came the period of Elegiac and Iambic poetry (700–480), both Ionian, in which the poet's own feelings and personality became distinctly manifested, the chief names being those of Callinus of Ephesus (flourished about 690 B.C.), Tyrtæus, originally of Attica (675), Archilochus of Paros (670), Simonides of Amorgos (660), Mimnermus of Smyrna (620), Solon of Athens (594), Theognis of Megara (540), Phocylides of Miletus (540), Xenophanes of Colophon (510), Hipponax of Ephesus (540), Simonides of Ceos (480). Greek lyric poetry was inseparably linked with music, the lyric period proper lasting from about 670 to 440 B.C. Two principal schools may be distinguished, the Æolian and the Dorian. To the former belong Alcæus (611–580), Sappho (610), and Anacreon (530), though the works which now bear Anacreon's name are spurious. To the Dorian school belong Alcman of Sparta (660 B.C.), credited with the invention of the strophe and antistrophe, Stesichorus (Tisias) of Himera (620), who added to these the epode, Arion (600), who gave shape to the dithyramb, and Ibycus of Rhegium (540). Simonides of Ceos (480) was even more famous as lyric poet than as elegist, his lyrics marking the commencement of a school of national lyric poetry. His nephew, Bacchylides, was also famous, but the chief was undoubtedly Pindar (522–443). About this time began a new literary development, that of the drama, the earliest names in which are Thespis (536) and Phrynichus (512–476). The performance at first, however, was merely a sort of oratorio or choral entertainment, until Æschylus (525–456) introduced a second actor, and subordinated choral song to dialogue. A third and even a fourth actor was added by Sophocles (495–405 B.C.), who supplemented the heroic tragedy of Æschylus with the tragedy of human character and the fundamental passions. Euripides (480–406) brought new qualities of picturesqueness, homeliness, and pathos with a less rigid artistic method, and formed a fitting third in the great tragic triad. With this rapid growth of tragedy there was a corresponding development of comedy which assumed an artistic form about 470 B.C. The names of Cratinus (448) and Eupolis (430) are overshadowed by that of Aristophanes (448–385), who for nearly forty

years was the burlesque commentator upon the life of the period. Aristophanes may be regarded as closing the period of the old comedy; the middle comedy of from 390 to 320 (Antiphanes, Alexis, and others) was transitional from the great political comedy to the new comedy of manners, which was vigorous from 320 to 250 in the hands of Menander, Philemon, and Diphilus.

In the meantime a prose literature had arisen, commencing with the group of early Ionian writers (550–450), of which Pherecydes of Syros, Anaximenes, and Anaximander, philosophers, and the logographer or compiler Hecatæus of Miletus were chief. Hellanicus of Mitylene (450) was one of the earliest critical historians, but Herodotus (484–428) was the first writer of great historic rank, as he was also the first great prose stylist. Thucydides (471–400?) was the founder of philosophic history, and Xenophon (431–354), who has left excellent historic narratives, was also the earliest Greek essayist. The oldest piece of Attic prose is the essay on Athenian polity wrongly assigned to Xenophon. Other writers in history were Ctesias (415-398), Philistus (363), Theopompus (352), and Ephorus (340). From 360 onwards Attic history and archæology were preserved in works by various writers, of whom Philochorus (306–260) was chief. The study which oratory and rhetoric received in Athens was an important factor in shaping Attic prose, the chief orators being Antiphon (480–411), Andocides (415–390), Lysias (403-381), Isocrates (436–338), Isæus (390–353), and above all, Demosthenes (384–322) with his contemporaries Æschines, Lycurgus, and others, and Demetrius of Phalerum (318) who ushered in the decline of oratory. Philosophy shared the development of history and oratory, reaching a rare elevation in Plato (429–347), a rare comprehensiveness in Aristotle (384-322), the founders of the academic and peripatetic schools. Minor Socratic schools were the Cyrenaic, founded by Aristippus (370), the Megaric, founded by Euclid (399), and the Cynic, founded by Antisthenes. In the earlier part of the 3d century the rival schools of Epicurus (342–270) and of Zeno (344–260) became prominent.

From about the year 300 B.C. the literary decadence may be held to date; the period 300 to 146 being known as the Alexandrian. It comprises the learned poetry of Callimachus (who flourished at Alexandria 250 B.C.) and of Lycophron (260), the epic of Apollonius Rhodius (194), the didactic poetry of Aratus (270), and Nicander (150), the pastoral poetry of Theocritus, Bion, and Moschus, the satirical Silloi of Timon (280), the philology and criticism of Zenodotus (280), Aristophanes of Byzantium (200), Aristarchus (156), and Apollodorus (140), the version of the Septuagint, and the scientific works of Eucleides (300), Archimedes and Eratosthenes (240). From 146 B.C. dates the Græco-Roman period in Greek literature, to which belong the historians Polybius (145 B.C.), Diodorus Siculus (40 B.C.), Dionysius of Halicarnassus (25 B.C.), Josephus, Arrian (100 A.D.), Appian (140 A.D.), and Herodian (240 A.D.), the biographies of Plutarch (90 A.D.), of Diogenes Laertius and of Flavius Philostratus (235 A.D.), the geographies of Strabo (18 A.D.) and of Pausanias (160 A.D.), the astronomy and geography of Ptolemy, the informatory works of Athenæus (190), Ælian (220), and Stobæus (480), the rhetorical and belles-lettristic works of Hermogenes (170), Apthonius and Cassius Longinus (260), the medical works of Galen (160), the satirical works of Lucian (160) and of Julian (331–363), the development of the Greek romance, best represented in Heliodorus (390), Achilles Tatius, and Chariton, &c. During this period philosophy is in the main divided between Stoicism and Neoplatonism, the former represented by Epictetus (90 A.D.) and Marcus Aurelius (170), the latter by Plotinus (240), Porphyry, and Iamblichus. The school of Athens had for chief exponent the eclectic Proclus (450). In verse the best names were the fabulist Babrius (40), Oppian (180), Nonnus, Quintus Smyrnæus (400–450), and Musæus (500). The special feature of the later Græco-Roman period was the rise of a Christian Greek literature represented by the patristic epistles, homilies, &c., and ecclesiastical histories, such as those of Eusebius, Socrates, and Sozomen. Among the chief writers were Justin Martyr, Origen, and Clement of Alexandria, Eusebius, Gregory of Nazianzus, Basil, Gregory of Nyssa, Chrysostom, &c. After 529 and until 1453 came the Byzantine period, of which the most important section was from about 850 to 1200. It was characterized by such writers as Eustathius, Photius, and Suidas, mainly occupied in the attempt to reduce to system a large ill-ordered and aimless erudition.

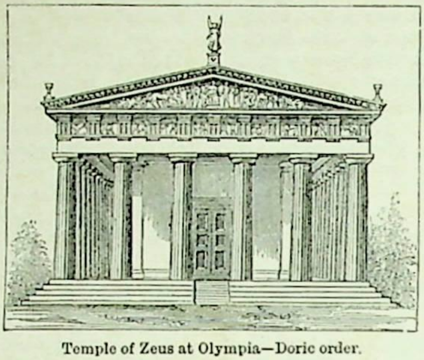
On the fall of Constantinople in 1453 the cultivated classes who still retained the pure

Greek either perished or took to flight, or adopted the language of the conquerors. The popular Greek, however, survived, and despite its vulgarization and the modification of its grammatical forms and syntax, it cannot be said that Greek has been a dead language at any period since Homer. By some modern Greek literature is dated from Theodore Prodromos (1143–80), a monk and writer of popular verse, but the only names of importance until the close of the 18th century are those of Maximus Margunius (1530–87), Anacreontic poet and letter writer, Leo Allatius (1586–1669), Sciote scholar and poet, George Chortakes (17th cent.), Cretan poet, Franciscus Scuphos, Cretan writer on rhetoric (1681), Elias Meniates (1669–1714), a Cephalonian ecclesiastic, Vincentius Kornaros, Cretan poet, author of Erotocritos (1756), Kosmas, the Ætolian (1714–79), preacher and founder of schools, Rhegas Pherraios (latter half of 18th cent.), patriotic poet, Eugenios Bulgaris (1716–1806), writer of scientific and religious works, and Nicephorus Theotokes (1736–1800), writer on metaphysics and theology. At this period the patriotic movement found one outlet in the purification of the language and the development of a new literary impulse. The most important figure was that of Adamantros Koraes or Coray (1748–1833), who did more than all his predecessors to found a literature. Anthimos Gazes (1764–1837) and Athanasius Christopulos (1772–1847) were eminent as grammarians and lexicographers, the latter also as a lyric poet. Neophytus Bambas (1770–1855), miscellaneous educational writer, Constantine Æconomos (1780–1857), theological writer, Theoclytus Pharmakides (1784–1862), ecclesiastic and journalist, Spiridion Zampelios, literary antiquary, and Trikoupis, orator of the struggle for independence, were also prominent. The poetry of the people is represented chiefly in the songs of the Klephts and other songs dating from the war of independence. At this period the war-songs of Rhigas were sung by the whole nation, and at a later period the two Soutzos, Panagios and Alexander, Calvos, Solomos, and others, earned distinction in the same kind of poetry. The Soutzos were further distinguished as satirists, and Alexander ranks also with the dramatists Rhisos Neroulos and Zampelios. Among the most gifted of recent writers is Rhisos Rangabé, distinguished in lyric, dramatic, and epic poetry, also as a novelist and a scholar.

Ancient Greek Art. — As in literature so in art the Greeks attained the highest pitch of excellence, and in architecture and sculpture furnished models for the rest of the world. In no other race has the artistic spirit been so generally diffused throughout the people, expressing itself in the minor arts of life, in the practical application of ornament in the forms of domestic furniture, pottery, metal work, mosaics, and the like, not less perfectly than in the masterworks of architecture and sculpture.

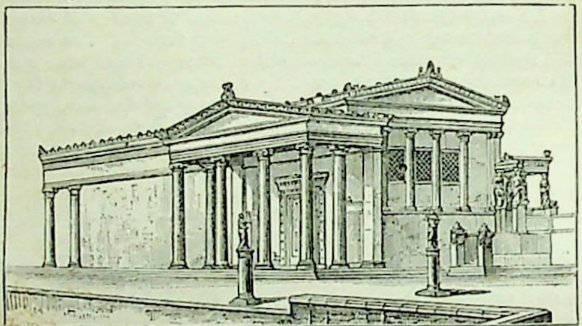
The earliest architectural remains in Greece are pre-Hellenic in origin and Asiatic in character, Greek architecture proper dating from about the close of the 8th century B.C. The earliest known example—the Doric temple at Corinth—belongs to about the middle of the 7th century B.C., and points to an Egyptian origin, the style being remotely derived from the so-called 'proto-Doric' temple of Beni Hassan in Lower Egypt. Throughout the history of the art it is the public buildings, more particularly the temples, in which the genius of the Greeks displayed itself. The private houses remained simple and even rude in appearance, rarely rising above a single storey, and having no external decoration. The temples were for the most part rectangular, though the circular form sometimes occurs in the later periods of Greek art. In the simplest form of the rectangular temple (the *apteral*) there were no columns; but, by an easy development from this, the side walls were carried out beyond those constituting the ends of the building, so as to form a porch. The extended walls terminated in pilasters (*antæ*) between which, in the front line of the porch, two columns were placed. As a further development, four additional columns were placed in advance of the line connecting the *antæ*, sometimes in front only (prostyle), sometimes at both ends (amphiprostyle). More complex forms were known as *peripteral*, where the columns were carried completely round the building; as *dipteral*, where a double range of columns surrounded it; and as *pseudo-dipteral*, where a double range of columns was placed in front and rear, but only a single range at the sides. The dipteral and pseudo-dipteral styles were seldom employed, the chief example of the dipteral having been the temple of Diana at Ephesus, built by Ctesiphon in the 6th century B.C. Most of the famous temples in Greece were, however, peripteral. Three orders are dis-

tinguished in Greek architecture according to the treatment of the pillars and of the entablature—the Doric, Ionic, and Corinthian (which see). Of these the Doric is the most ancient, the most important examples in Greece, besides that already mentioned, being the temple at Ægina (middle of the 6th century B.C.), the temple of Theseus at Athens, and the Parthenon, constructed about 448 B.C. by the architects Ictinus and Callicrates, and adorned with unsurpassed sculpture by Phidias and his pupils.



Temple of Zeus at Olympia—Doric order.

Next to these came the temple of Zeus at Olympia, the temple of Apollo at Bassæ, the frieze of which is in the British Museum, the temple of Minerva at Sunium, the great temple at Rhamnus, and those at Selinus in Sicily (middle of 7th century), Agrigentum, Segesta, and Pæstum. The oldest Ionic temple in Greece was probably the temple of Ilissus (about 488 B.C.), but the oldest of which remains are still visible is that dedicated to Juno at Samos, and there are remains of a fine temple of this order at Teos. The most perfect example, however, is the Erechtheum at Athens. The Corinthian order, though Grecian in its origin, is represented amongst the Greek temples by a single example only, that of the Zeus Olympius at Athens; and even this temple belongs to the Roman period. The Choragic monument of Lysicrates at Athens also belongs to this order. The beauty of the Greek buildings was heightened in respect of form by a deviation from ordinary rectilinear construction, in the systematic substitution of delicately-curved lines for straight lines in the columns and steps of their temples, and wherever the illusion attending the sight of straight



The Erechtheum at Athens—Ionic order.

lines in perspective was likely to prove an element of weakness. Colour and gilding also played an important part in the total effect, the old tufa temples being coloured throughout, and even in the marble temples, though it is doubtful if the marble columns were ever coloured, the mouldings of cornices and ceilings, the capitals of the antæ, the mouldings of the pediment and the triglyphs were all decorated with colour. The colonnades and porticoes, which were usually built round market-places and along quays in seaport towns, were similar in style to the temples. See also *Architecture*.

Greek *sculpture* has been divided into five principal periods, namely, 1. The Dædalian or Early (–580 B.C.). 2. The Æginetan or Archaic (580–480 B.C.). 3. The Phidian or Grand (480–400 B.C.). 4. The Praxitelean or Beautiful (400–250 B.C.). 5.

The Decline (250 B.C. onwards). The age of Dædalus marks an advance from an earlier primitive sculpture in which blocks of wood and stone were rudely fashioned into the semblance of life, the imperfections of the art being concealed by real hair and adventitious draperies. During the Dædalian period the treatment was highly conventionalized, a single type serving for a variety of divinities and heroes, the hair being often entirely curled and gathered into a club behind, and the dresses of the female divinities being divided into a few perpendicular folds. Many of these characteristics survived in the Æginetan period, but a higher knowledge of anatomy and greater freedom and boldness of treatment are apparent. The sculptures of the Theseum form a connecting link between the Æginetan school and that of Phidias. To Phidias, besides his statues of Athena and Zeus, were due the designs for the sculptures of the Parthenon, the actual work of these, however, being probably done by his pupils Alcamenes, Agoracritus, and other artists of his time. To this age belonged the sculptor and architect Polycletus (about 452–412 B.C.), whose statue of a youth holding a spear obtained the name of The Canon, as being a standard of form. About the same time the Bœotian sculptor Myron flourished, the famous Discobolus being a reproduction in marble of one of his bronzes. The Praxitelean period is characterized by greater grace and elegance in choice of subject and treatment, together with more of the sensual element making for ultimate decline. Praxiteles excelled in female figures, his Aphrodite at Cnidus in Caria being his most famous work. His rival, Scopas of Paros, was employed on the bas-reliefs of the Mausoleum at Halicarnassus, and was the sculptor of the famous group representing the destruction of the children of Niobe. In Lysippus of Sicyon, in the time of Alexander the Great, the Praxitelean school found its last great figure prior to the decline of the art.

Painting in Greece is said to have had its origin in Sicyon, and to have existed as mere outline and monochrome until Cimon of Cleonæ introduced variety in colouring, foreshortening, and a less rigid art. The Greek artists worked in wax or resin or in water-colour, brought to the required consistency by mixing with gum, glue or white of egg; and they painted upon wood, clay, plaster, stone, parchment, and canvas. Until a late period, however, they rarely painted upon walls, usually painting upon panels or tablets to be encased in walls. The earlier masters appear to have used only four colours—red, yellow, white, and black, but by the time of Apelles and Protogenes many other pigments were in use. The earliest painters of renown were Micon of Athens (about 460 B.C.), and Polygnotus of Thasos and of Athens (about 463–430 B.C.); but a higher degree of illusion and realism appears to have been reached under Zeuxis and his rival Parrhasius, towards the close of the 5th century B.C. A greater name than any of these is that of Apelles, the friend of Alexander the Great, contemporaneously with whom flourished Protogenes of Caria, painter and statuary, and Nicias of Athens, a distinguished encaustic painter. Of the work of these artists only a general conception can be formed from the mosaics and frescoes of Pompeii.

Greek Church, or Holy Oriental Orthodox Apostolic Church, that section of the Christian church dominant in Eastern Europe and Western Asia, especially in Turkey, Greece, Russia, and some parts of Austria. In the first ages of Christianity numerous churches were founded by the apostles and their successors in Greek-speaking countries; in Greece itself, in Syria, Egypt, Mesopotamia, Asia Minor, Thrace, and Macedonia. These were subsequently called Greek, in contradistinction to the churches, in which the Latin tongue prevailed. The removal of the seat of empire by Constantine to Constantinople, and the subsequent separation of the eastern and western empires afforded the opportunity for diversities of language, modes of thinking, and customs to manifest themselves, and added political causes to the grounds of separation. During the earliest period the chief seats of influence in the Eastern Church were Jerusalem, Antioch, and Alexandria, the seat of that mystical philosophy, by which the oriental church was distinguished. In 341, soon after the synod of Antioch, the rivalry between the Bishop of Rome and the Bishop of Constantinople began to assume importance, and before 400 differences of doctrine with respect to the procession of the Holy Spirit appeared. The council of Chalcedon in 451 accorded to the eastern bishop the same honours and privileges in his own diocese as those of the Bishop of Rome, and in 484 each bishop excommunicated the other. The title of *Œcumenical*

Patriarch was assumed by John, Bishop of Constantinople, in 588, and in the following year the phrase 'Filioque' ('and the Son') was added by the Latins to the Nicene creed (which now read 'proceeding from the father and the son'), an addition to which the Greek Church was opposed. In 648 Pope Theodore deposed Patriarch Paul II.; but a reconciliation of the churches was effected at the Council of Rome (680). The doctrines of the Greek Church were defined by John Damascenus in 730. The disruption was hastened by the banishment of Ignatius by Michael the Drunken and the consecration of Photius (858). The Pope Nicholas I. and Photius excommunicated each other in 867. The schism was temporarily healed after the death of Photius, but Michael Cerularius reopened it by charging the Latins with heterodoxy. He was excommunicated by Leo IX. in 1054, and in turn excommunicated the pope in the same year, since which the Greeks have been severed from the Roman communion, though the Russo-Greek Church was not separated until the 12th century. The presence of the Crusaders in the East aggravated the quarrel; Latin patriarchates were established in Antioch and Jerusalem, and, though on the capture of Constantinople by the Crusaders a Latin patriarchate was set up there (1204), the schism was revived there as soon as the Latin empire fell (1262). Reunion was proposed in 1273 by Patriarch Joseph, and effected, with the acknowledgment of the pope as primate, at the council of Lyons (1274). The union, however, was annulled in 1282 by Emperor Andronicus II., and in 1283 and 1285 by synods of Constantinople. It was again effected under John Palæologus at Florence in 1439, but was repudiated in 1443 by the Patriarchs of Alexandria, Antioch, and Jerusalem. In 1453, when the patriarch fled from the Turks, a schismatic Gregory Scholarius was chosen in his place. In 1575 unsuccessful negotiations were commenced with a view to union with the Lutherans, and in 1723 the English bishops even proposed that the Greek and Anglican churches should unite, a proposal revived by the Archbishop of Mosco win 1866. The claims of the czar in 1853 to the protectorate of the Greek churches in Turkey was one of the causes of the Crimean war.

The Greek Church is the only church which holds that the Holy Ghost proceeds from the Father only; the R. Catholic and Protestant Churches deriving the Holy Ghost from the Father and the Son. Like the R. Catholic Church it has seven sacraments—baptism; chrism; penance, preceded by confession; the eucharist; ordination; marriage; and unction. But it is peculiar—1, in believing in baptism by threefold immersion, the chrism (confirmation) following immediately after it; 2, in adopting, as to the eucharist, the doctrine of the real presence and transubstantiation; but in ordering the bread to be leavened, the wine to be mixed with water, and both elements to be distributed to every one, even to children; 3, the parochial clergy are required to be married, but only once and to a virgin, and marriage must take place before ordination; widowed clergy are not permitted to retain their livings, but go into a cloister, where they are called *hieromonachi*. Rarely is a widowed bishop allowed to preserve his diocese. The Greek Church grants divorce in case of proved adultery, but it does not allow even the laity a fourth marriage. It differs also from the Roman Catholic Church in anointing with the holy oil, not the dying but the sick, for the restoration of health, forgiveness, and sanctification. It rejects the doctrine of purgatory, works of supererogation, indulgences, and dispensations, but admits prayers for the dead, whose condition appears to be considered undetermined until the final judgment. It recognizes no visible vicar of Christ on earth, but the spiritual authority of patriarch is little inferior to that of the pope. It allows no carved, sculptured, or molten image of holy persons or subjects; but the representations of Christ (except in the crucifix), of Mary, and the saints, must be merely painted, and at most inlaid with precious stones. In the Russian churches, however, works of sculpture are found. In the invocation of the saints, and especially of the Virgin, the Greeks resemble the Latins. They also hold relics, graves, and crosses sacred; and crossing in the name of Jesus they consider as having a wonderful and blessed influence. Among the means of penance, fasts are particularly numerous with them. They fast Wednesday and Friday of every week, and besides observe four great annual fasts, namely, forty days before Easter; from Whitsuntide to the days of St. Peter and Paul; the fast of the virgin Mary, from the 1st to the 15th of August; and the apostle Philip's fast, from the 15th to the 26th of November; besides the day of the behead-

ing of John the Baptist, and of the elevation of the cross. The calendar of the Greek Church is in the old style, their new year's day falling on Jan. 13th.

The services of the Greek Church consist almost entirely in outward forms. Preaching and catechizing constitute the least part of it. Instrumental music is excluded altogether. The mass is considered of the first importance. The convents conform, for the most part, to the strict rule of St. Basil. The Greek abbot is termed *higumenos*, the abbess *higumenē*. The abbot of a Greek convent which has several others under its inspection is termed *archimandrite*, and ranks next a bishop. The lower clergy in the Greek Church consist of readers, singers, deacons, &c., and of priests or popes and protopopes or archpriests, who are the first clergy in the cathedrals and metropolitan churches. The members of the lower clergy can rise no higher than protopopes, for the bishops are chosen from among the monks, and from the bishops are selected the archbishops, metropolitans, and patriarchs. In Russia there are twenty-four dioceses. With which of them the archiepiscopal dignity shall be united depends on the will of the emperor. The seats of the four metropolitans of the Russian Empire are St. Petersburg, Kiev, Kasan, and Tobolsk. In the Turkish dominions the dignities of Patriarch of Constantinople, Alexandria, Antioch, and Jerusalem still subsist. The Patriarch of Constantinople still possesses the ancient authority of his see; the other three patriarchs exercise a very limited jurisdiction, and live for the most part on the aid afforded them by the Patriarch of Constantinople.

Greek Fire, an inflammable and destructive compound used in mediæval warfare, especially by the Byzantine Greeks. It was poured from cauldrons and ladles, vomited through long copper tubes, or flung in pots, phials, and barrels. The art of compounding it was concealed at Constantinople with the greatest care, but it appears that naphtha, sulphur, and nitre entered into its composition.

Greek Language, Literature, &c. See under *Greece*.

Greek Wines, though formerly well known in England under the names of Cyprus and Malmsey, are now less known than they deserve, being strong, rich, full wines. Thera is said to be peculiarly luscious; Patras resembles Hock; St. Elie and Kephisia are respectively of the Amontillado and Chablis character. The Noussa, Patras, and Kephisia red wines have some kinship with the unfortified Rhône or Burgundy wines. Vinsanto and Lachrymæ Christi, the former white, the latter red, are excellent dessert wines, and the Santorin wines are also favourably known.

Greeley, Horace, American journalist and politician, born in 1811; worked first on a farm, then as compositor. In 1831 he went to New York, where, after an unsuccessful attempt to start the Morning Post, the first penny paper, he commenced in 1834 to issue the Weekly New Yorker, which ran for seven years. The Log Cabin, another weekly, established by him in 1840, reached a circulation of 80,000, and gave him a reputation which ensured the success of his Daily Tribune, founded in 1841, and edited by him till his death. In 1848 he was elected to Congress, but failed to impress his constituents with the necessity of returning him a second time. In 1851 he visited Europe, and was one of the jurors in the Great Exhibition. He opposed the civil war, but was a firm supporter of the Union and of President Lincoln, and at the close of the war advocated a general amnesty and universal suffrage. In 1872 he was nominated for the presidency in opposition to General Grant, but was defeated. The strain of electioneering and the death of his wife brought on an illness, of which he died a few weeks later. Chief among his miscellaneous works are his Hints towards Reforms (1850), Glances at Europe (1851), History of the Struggle for Slavery Extension (1856), The American Conflict (1864), Recollections of a Busy Life (1869).

Green, John Richard, historian, born in 1837; ordained curate in 1860, subsequently vicar of St. Philips, Stepney, and librarian to the Archbishop of Canterbury at Lambeth. For some time he wrote constantly for the Saturday Review; but he was comparatively little known until the publication in 1874 of his Short History of the English People, which secured him immediate fame. It was followed by a larger edition of the same work entitled A History of the English People (1877–80), a volume of Stray Studies from England and Italy, and the Making of England (1882). Latterly his work was carried on in distressing conflict with lung disease, and he died in 1883. The Conquest of England, his last work, was published posthumously by his wife, being almost complete at his death.

Green, THOMAS HILL, English philosophical writer, born 1838; fellow of Balliol College in 1862, and first lay tutor on that foundation in 1867. In 1877 he was appointed Whyte's professor of moral philosophy; but his work was abruptly closed by his death in 1882. Apart from his Prologomena to Ethics, published posthumously in 1883, the bulk of his work was in the form of articles contributed to the North British and Contemporary Reviews. He was one of the strongest opponents of the English empirical school.

Greenbacks, the popular name given to the paper currency first issued by the United States government in 1862 during the civil war. It is sometimes used also to include United States bank-notes.

Green Bay, a city of Wisconsin, U. S., on Fox River, near the head of Green Bay. It has a great trade in lumber and various flourishing industries. Pop. 9069.

Green-brier, a popular name in the United States for a very common thorny climbing shrub, *Smilax rotundifolia*, having a yellowish-green stem and thick leaves, with small bunches of flowers.

Green-broom, the *Genista tinctoria*, or dyer's-weed. See *Genista*.

Green-dragon, a North American herbaceous plant, the *Arisæma Dracontium*, one of the arum family, called also wake-robin. For another green-dragon, see *Dracunculus*.

Greene, MAURICE, an English composer, born about 1696. He was in turn organist at St. Paul's, at the Chapel Royal, and held the chair of music at Cambridge. His works include a Te Deum, several oratorios, a masque, The Judgment of Hercules, an opera, Phoebe (1748), and various glees and catches. His collection of Forty Anthems is well known. He died in 1755.

Greene, NATHANIEL, a general of the American revolutionary army, born at Potowhommet, Rhode Island, in 1742. In 1770 he was elected to represent Coventry in the general assembly of Rhode Island, and was soon after excommunicated by the Quakers for taking arms on the prospect of war with Britain. In 1774 he joined the Kentish Guards as a private, and in May, 1775, he was appointed brigadier-general and commander of the Rhode Island contingent in the army before Boston. He gained at once the confidence of Washington, was made major-general, and appointed to the command in New Jersey. At Trenton (1776) and Princeton (1777) he led a division, and in the subsequent fighting he held important commands, and repeatedly distinguished himself. In 1778 he was quartermaster-general, and in 1780 presided at the trial of Major André. In the same year he was appointed to the command of the southern army, and succeeded, after repeated defeats, in wresting Georgia and the Carolinas from the British. He died in 1786.

Greene, ROBERT, British dramatist, born about 1560; studied at Cambridge, and took his degree of B.A. in 1578, after which he travelled on the Continent. He graduated M.A. in 1583, lived a wild and profligate life, and died in poverty in 1592. His works consist of plays, poems, tales, and tracts. His chief romances are Pandosto (1588), The History of Arbasto (1617), A Pair of Turtle Doves (1606), Menaphon (1587). His plays include The Honourable Historie of Friar Bacon and Friar Bungay (1594), Orlando Furioso (1594), Alphonsus, king of Arragon (1597), and James IV. (1598). Amongst his miscellaneous works are The Myrrour of Modestie (1584), Morando (1584), Euphues, his censure to Philautus (1587), Perimedes (1588), Alcida (1588), Spanish Masquerado (1589), and various pamphlets and autobiographical works, such as his Never-too-late (1590), Greene's Vision (1592), The Repentance of Robert Greene (1592), and Farewell to Folly (1591). His Groat's worth of Wit bought with a Million of Repentance (1592), is remarkable for the allusion to Shakspere, 'an upstart crow, beautified with our feathers.' His Pandosto furnished the basis for Shakspere's Winter's Tale.

Green Earth, an opaque, dull, olive-green, soft, earthy mass, generally met with in cavities in amygdaloidal rocks. It consists of silicate of iron and aluminium, with potassium and sodium in water.

Green-ebony, an olive-green wood obtained from the South American tree *Jacaranda ovalifolia*, nat. order Bignoniaceæ, used for round rulers, turnery, marquetry work, &c., and also much used for dyeing, yielding olive-green, brown, and yellow colours.

Greenfinch, GREEN-LINNET, or GREEN GROSBEAK (*Coccothraustes chloris*), a bird of the finch family, and one of the most common of British and European birds. It frequents hedges, gardens, and small plantations, and feeds on grain, seeds, or insects. Its song is not melodious, but it easily becomes tame. It builds in hedges, bushes,

and low trees, the nest being of green moss and coarse fibrous roots, lined with finer roots, horse-hair, and feathers. The eggs (four to six) are bluish white, spotted at the larger end with purplish gray and dark brown. The general colours of the male are green and yellow, those of the female inclining to brown.

Green Gage, a variety of the plum, the *reine claude* of the French, introduced into Britain by a person named Gage. It is large, of a green or yellowish colour, and has a juicy, greenish pulp of exquisite flavour.

Greenheart (*Nectandra Rodiæi*), a tree of the nat. order Lauraceæ, a native of Guiana, called also the *bebeeru*. Its wood is hard and durable, and is used in ship-building, not being liable to attacks from the Teredo. The bark contains the alkaloid bebeerine. See *Bebeerine*.

Greenhouse, a building constructed chiefly of glass for the preservation of delicate plants. A greenhouse is sometimes distinguished from a hothouse by not requiring artificial heat during summer, and from a conservatory in having the plants in pots and not in the ground. The lean-to form, in which advantage is taken of a house or garden wall as a support, is frequently used, but the growth of plants in such houses is one-sided, and the span or arch-roofed structures, with glass on all sides, are to be preferred. The materials used are chiefly glass, wood, and iron.

Greenland (Danish and German, *Grönland*), an extensive island belonging to Denmark, situated on the north-east of the continent of N. America, from which it is separated by Davis's Straits, Baffin's Bay, and Smith's Sound. A small part of its northern and precipitous eastern coast is yet unknown; but it does not extend further north than about lat. 83°. Like the northern parts of N. America generally, Greenland is colder than the corresponding latitudes on the east side of the Atlantic. In June and July the sun is constantly above the horizon, the ice on the coast is broken up and floats southward, and a few small lakes are opened; but the short summer is followed by a long and dreary winter. The interior, which is lofty and has the appearance of one vast glacier, is uninhabitable, and all the villages are confined to the coasts, which are lined with numerous islands, and deeply penetrated by fiords. The Danish colony extends north, on the western coast, to the Bay of Disco, in lat. 69° N. Cultivation is confined to the low shores and valleys, where grassy meadows sometimes occur with stunted shrubs and dwarfed birch, alder, and pine trees. Attempts to raise oats and barley have failed, but potatoes have been grown towards the southern extremity. Turnips attain the size of a pigeon's egg, and cabbages grow very small. The radish is the only vegetable which grows unchecked. The inhabitants are largely dependent upon hunting and fishing. Whale blubber and seal oil are used as fuel. Despite the proximity of America the flora and fauna are rather of an European character. The land animals are the Esquimaux dog, the reindeer, the polar bear, the Arctic fox (blue and white), the ermine, the Arctic hare, and the musk ox. Among the amphibia the walrus and several species of seal are common. The seas abound in fish, the whale and cod fisheries being of special importance. Sea-fowl are abundant in summer, and largely killed. The chief mineral product is cryolite, but graphite and miocene lignitic coal are also found. Oil, eider down, furs, and cryolite are exported. The population, which is chiefly Esquimaux, numbers about 10,000. For administrative purposes Greenland, or rather its coast, is divided into two inspectorates of North and South Greenland. The residences of the inspectors are at Disco Island and Godhaab, but the most populous district is Julianshaab (pop. 2200).

Greenland was discovered by an Icelander named Gunnbjörn about 876 or 877. It was colonized from Iceland about end of 10th century, and other Scandinavians followed. In 1264 it was politically united with Norway, and about the middle of the 14th century possessed two flourishing colonies on the west coast, named West Bygd and East Bygd. These settlements, however, gradually disappeared from history, and the expeditions sent by Denmark in 1585, 1606, 1636, 1654, and 1670 for the purpose of finding the colony were unsuccessful. Various relics, inscriptions, &c. have been found. In the reign of Elizabeth Frobisher and Davis rediscovered the coast, but nothing was done to explore it until the Danish government in 1721 assisted Hans Egede, a clergyman, to establish a European mission settlement, Good Hope (*Godhaab*), which was successfully carried on by him and his son (see *Egede*, *Esquimaux*). Whale-fisheries were established on the coast by the English and

Dutch about 1590. The interior of the country was first crossed from east to west by Nansen in 1888.

Green Mountains, a mountain range, United States, commencing near Newhaven, Connecticut, and extending north through Massachusetts and Vermont, between Lake Champlain and the Connecticut River. The highest summits are Mansfield Mountain (4279 ft.) and Camel's Hump (4188 ft.), both in Vermont.

Greenock, a parliamentary burgh and seaport town of Scotland, county Renfrew, on the southern shore of the estuary of the Clyde, here between 3 and 4 miles wide, about 20 miles west by north of Glasgow. It stands partly on a narrow level tract of land stretching along the margin of the sea; and partly on some heights, which rise behind, and to the south and west of the lower parts of the town. The lower and older parts of the town are mean and crowded. The principal public buildings are the custom-house, the tontine, the Watt monument, containing the Greenock library, and the Watt Museum and Lecture Hall, the municipal buildings, the sheriff court buildings, post-office, &c. South-west of the town is a beautiful cemetery. There are several pieces of ground devoted to recreation, and the river esplanade, 100 ft. wide and 6200 ft. long, forms a fine promenade. The manufactures include numerous sugar-refineries, ship-building yards, iron-foundries and machine establishments; chemical works; worsted, woollen, and paper mills; grain, saw, and sundry other mills; jute and bagging factories, roperies, and sail-making establishments. Greenock carries on a considerable coasting and foreign shipping trade, especially with East and West Indies, America, and Australia. The docks are spacious and possess every accommodation for shipping, including five graving docks, hydraulic and steam cranes, &c.; and the harbour accommodation is being increased. Large numbers of vessels unload at Greenock and ascend to Glasgow for cargoes. The value of produce imported from abroad in 1887 was £3,000,000; in 1894 £1,591,643; the exports to foreign parts are insignificant. Greenock was an important fishing and shipping port in the end of the 17th century, after which it began rapidly to extend. It was the birthplace of James Watt. Greenock sends one member to parliament. P. (1891), 63,423.

Green Paints are for the most part compounds of copper and of chromium. The best known greens are the following:—*Bremen* green, or verditer, consisting mainly of a basic carbonate of copper. *Brunswick* green, a hydrated oxychloride of copper; but the name is sometimes given to a hydrated basic carbonate, also known as *mountain* green. *Chrome* and *emerald* green are oxide of chromium. *Emerald* green (which see) is also used as synonymous with *Schweinfurt* green. *English* green is a mixture of Scheele's green with gypsum. *Guignet's* green is oxide of chromium prepared in a peculiar way. *Hungary* green is a kind of malachite found in Hungary. *Rinman's* green is got by heating zinc oxide with a cobalt compound. *Saxony* green is an indigo colour used in printing. *Scheele's* green is arsenite of copper, and *Schweinfurt* green, *Veronese* green, and *Vienna* green, are also compounds of arsenic and copper. *Verdigris* is a hydrated basic carbonate of copper, often seen in copper saucepans. Besides these are green colours derived from plants. Of these may be mentioned *chlorophyll*, the green colour of leaves; *sap* green, the juice of *Rhamnus catharticus* or buckthorn, made into a green lake with alumina; *Chinese indigo-green*, &c.

Green River, United States, Kentucky, flows generally west and north-west, and enters the Ohio 200 miles below Louisville. It is navigable for boats for about 200 miles.

Greens, a common name given to various species of green vegetables used for table, as open-leaved cabbage, spinach, &c.

Greensand, a name common to two groups of strata, occurring in the south-east of England, the Isle of Wight, &c., the one (lower greensand) belonging to the lower cretaceous series, the other (upper greensand) to the upper cretaceous series: between them is the clay called the gault. They consist chiefly of sands, with clays, limestones, and chert bands. They were named on account of the green colour, due to silicate of iron, which some of the beds show, though some tertiary sands are as green. The fossil contents are marine, and both deposits represent shore accumulations.

Greenshank, a well-known species of sand-piper (*Totănus glottis* or *T. ochrŏpus*), often called the whistling snipe from the shrill note it utters when first flushed. It breeds pretty commonly in the Hebrides, and sometimes in the north of Scotland, and is found as a visitor in the coast districts, lakes, and marshes of Britain. The bird is

about 12 inches long, rather prettily marked, and has the legs and toes olive-green.

Green-sickness. See *Chlorosis.*

Green-tea, a tea of a greenish colour. The green colour should be due to the mode in which the leaves of the tea-plant are treated in the process of drying.

Green-vitriol, a name formerly given to sulphate of iron.

Green-weed, dyer's-weed (*Genista tinctoria*). See *Genista.*

Greenwich (grĕn'ich), a parliamentary borough of England, county Kent, on the right bank of the Thames, about 5 miles S.E. of London Bridge. It is built partly on an acclivity, but chiefly on the level ground skirting the river. There are extensive iron foundries and engineering works, barge and boat-building yards, boiler works, mast, block, and sail works, telegraph cable works, roperies, chemical factories, &c. The object of greatest interest is the magnificent hospital, the oldest portion of which was originally a palace of Charles II. It was converted to its charitable purpose in the reign of William and Mary. Three additional wings were built from designs by Sir Christopher Wren, who also completed the unfinished pile of Charles II. As an hospital for aged and disabled seamen of the navy, it was opened in 1705, and subsequently accommodated about 3000. In 1865, however, it ceased to be an asylum for seamen, and is now the seat of the Royal Naval College for the education of naval officers. It also contains a naval museum and picture gallery. Adjoining it are the Royal Naval School for boys, and an infirmary for sick and disabled seamen. Greenwich Park, an open, undulating piece of ground, area 180 acres, finely wooded and well stocked with deer, is a favourite resort of holiday-making Londoners during the summer. The celebrated observatory of Greenwich, erected by Charles II. for Flamsteed, stands upon an eminence in the park. The longitude of all British maps and charts, and also of those issued by the government of the United States of America, as well as many of those published in other countries, is computed from this observatory, which is 2° 20′ 23″ W. from the observatory of Paris, and 18° E. from the meridian of Ferro. Greenwich (including Deptford and Woolwich) was erected into a parliamentary borough in 1832, and returned two members to Parliament. Since 1885 the three boroughs send each one member. Pop. (1891), 78,131.

Greg, WILLIAM RATHBONE, English writer, born in 1809, commissioner of customs in 1856, and controller of the stationery office in 1864. Besides his miscellaneous essays and pamphlets (collected in 1881 and 1882) he was the author of Sketches in Greece and Turkey (1833), The German Schism and the Irish Priests (1845), The Creed of Christendom (1851), Essays in Political and Social Science (1853), Enigmas of Life (1872), Rocks Ahead (1874), and Literary and Social Judgments (1877). He died in 1881.

Gregarin'idæ, a class of minute animal organisms, comprising the lowest forms of the Protozoa, found parasitic in various animals, especially the cockroach and earthworm. The Gregarinidæ consist of an outer colourless transparent membrane, with only faint signs of fibrillous structure, inclosing a granular mass, in which there is a nucleus surrounded by a clear space. They are destitute of a mouth, and have not the power of giving out pseudopodia, and hitherto no definite organs have been detected in them.

Grégoire (grā-gwär), HENRI, COUNT, bishop of Blois, a churchman and statesman of the French revolution, born 1750. In 1789, while curé of Emberménil, in the district of Nancy, he was sent by the clergy of Lorraine as their representative to the states-general. As one of the secretaries of the constituent assembly he joined the extreme democratic section, and in the convention voted for the condemnation, though not for the death, of the king. Although extreme in his democratic opinions, he was an unflinching Jansenist. He was a member of the Council of Five Hundred, of the corps législatif, and of the senate (1801). On the conclusion of the concordat he resigned his bishopric. He voted against the establishment of the imperial government, and alone in the senate resisted the restoration of titles of nobility. He himself afterwards accepted the title of count, but in the senate was always one of the small body who opposed Napoleon, and in 1814 was one of the first to vote for his deposition. He passed the latter part of his life in retirement, and died at Paris in 1831. He left numerous works, among them Ruines de Port Royal, 1801; Essai Historique sur les Libertés de l'Église Gallicane; Histoire des Sectes Religieuses depuis le Commencement de ce Siècle, 1810 and 1828; Annales de la Religion, 1795–1803.

Gregorian Calendar, the calendar as reformed by Pope Gregory XIII. in 1582

(see *Calendar*). The *Gregorian year* is the ordinary year, as reckoned according to the Gregorian calendar.

Gregorian Tones, in music, a tonal system introduced by Gregory the Great. In the early ages of church music the Greek system of tetrachords, or what was supposed to be the Greek system, was followed. There were in the time of Ambrose of Milan fifteen so-called Greek modes or scales in use. In order to simplify church music he selected four of these scales, the Dorian, Phrygian, Æolian, and Mixo-Lydian, to which he attempted to reduce all the chants and melodies sung in church. This selection of scales was soon found to be too limited. The church singers refused to be bound to it, and it failed to represent the melodies actually in use. In these circumstances Gregory the Great introduced a new reform and extension of church music. To each of the scales admitted by Ambrose he added a new scale or mode, commencing with the fourth below the key-note of the original scale. These new scales he called *plagal*, while to the four introduced by Ambrose he gave the name of *authentic*. He introduced the practice of naming the tones by the letters of the alphabet. The following is the arrangement of his eight scales:—

1st. Authentic (Dorian),...	D	E	F	G	A	B	C	D
2d. Plagal, ...	A	B	C	D	E	F	G	A
3d. Authentic (Phrygian),.	E	F	G	A	B	C	D	E
4th. Plagal,...............	B	C	D	E	F	G	A	B
5th. Authentic (Æolian),...	F	G	A	B	C	D	E	F
6th. Plagal,...............	C	D	E	F	G	A	B	C
7th. Authentic, Hyper Dorian or Mixo-Lydian,	G	A	B	C	D	E	F	G
8th. Plagal,...............	D	E	F	G	A	B	C	D

The scale of C, with the semitones between the 3d and 4th, and the 7th and 8th, which in the modern system is called the natural scale, and is the pattern on which all the others are formed, was thus, it will be seen, one of the plagal scales introduced as an innovation by Gregory.

Gregory, Patriarch of Constantinople, born in 1730, studied at Mount Athos, lived as a hermit, was made archbishop at Smyrna, and, in 1795, Patriarch of Constantinople. He led an active, tolerant, and benevolent life, promoted schools and the art of printing. In 1798, however, and again in 1806, he was accused of intriguing for the freedom of Greece, and twice banished to Mount Athos, though each time restored to his post after a short interval. But in 1821, when the Greek insurrection broke out in the Morea, his native country, he became once more an object of suspicion to the Porte, and when, shortly after, he allowed the family of Prince Morousi to escape from his guardianship, he was seized as he left the church on the first day of the Easter festival and hanged in his robes of office before the church gate.

Gregory, the name of thirteen popes, of whom we need notice only the following:—GREGORY I., called also the *Great*, born at Rome, of noble family, about 540. He became a member of the senate, and was made prefect of Rome in 573. He expended his inheritance in the foundation of monasteries and charitable institutions, and then took monastic vows himself. Pope Pelagius II. sent him on an embassy to Constantinople, and afterwards made him Papal secretary. On the death of Pelagius in 590 he was chosen his successor. He displayed great zeal for the conversion of heretics, sending missionaries to Sicily, Sardinia, Lombardy, England, &c., as well as for the advancement of monachism, and the enforcement of clerical celibacy. He died in 604. The works ascribed to him are very numerous; his genuine writings consist of a treatise on the Pastoral Duty, Letters, Scripture Commentaries, &c.—GREGORY VII. (*Hildebrand*), born about 1020 at Soana, in Tuscany; passed part of his early life in Rome, became a monk at Cluny, and then returned to Rome with Bruno on the election of the latter to the papal chair. He exercised great influence over Leo IX. (Bruno) and his successors, Victor II., Nicholas II., and Alexander II.; and under Nicholas II. he succeeded in depriving the clergy and people of Rome of a voice in the election to the pontificate by giving the power of nomination to the cardinals alone. On the death of Alexander II. (1073) he was raised to the Papal chair. His chief aim was to found a theocracy in which the pope should be the sovereign ruler, in political as well as ecclesiastical matters. He therefore prohibited simony and the marriage of priests (1074), and abolished lay investiture (1075), the only remaining source of the authority of princes over the clergy of their dominions. The Emperor Henry IV. refused to obey this decree, and Gregory, after deposing several German bishops who had bought their offices of the emperor, and excommunicating five imperial councillors concerned in this transaction, summoned the emperor before a council at Rome to defend himself against the charges brought against him. Henry then caused a sentence of

deposition to be passed against the pope by a council assembled at Worms. The pope, in return, excommunicated the emperor, and Henry, finding himself in difficulties, went to Italy and submitted at Canossa (1077) to a humiliating penance, and received absolution. After defeating Rodolph of Suabia, however, Henry caused the pope to be deposed by the Council of Brixen, and an antipope, Clement III., to be elected in 1080, after which he hastened to Rome and placed the new pope on the throne. Gregory passed three years as a prisoner in the castle of St. Angelo, and though finally liberated by Robert Guiscard, he was obliged to retire under the protection of Guiscard to Salerno, where he died in 1085.—GREGORY XIII. (*Ugo Buoncompagno*), born at Bologna in 1502; created cardinal in 1565; chosen successor of Pius V. in the popedom in 1572. He permitted the Cardinal of Lorraine to make a public thanksgiving for the massacre of St. Bartholomew, encouraged plots against Queen Elizabeth, and incited Philip II. to attack her. His foreign policy cost him much money for subsidies to excite enemies to the Turks and heretics, and his financial expedients to fill his exchequer ruined the trade and disturbed the peace of his own dominions. He did much to encourage education, his expenditure for this purpose exceeding two million Roman crowns, out of which many colleges at Rome were endowed. He reformed the Julian calendar (see *Calendar*). He died 10th April, 1585.

Gregory, JAMES, mathematician and inventor of the reflecting telescope, was born at Drumoak, in Aberdeenshire, about 1638, and received his education at Marischal College. In 1663 he published Optica Promota, explaining the idea of the telescope which bears his name. He spent some years in Italy, and published at Padua in 1667 a treatise on the Quadrature of the Circle and Hyperbola. He became professor of mathematics at St. Andrews in 1668, and at Edinburgh in 1674, but died suddenly in 1675.

Gregory, JAMES, M.D., physician, eldest son of John Gregory, M.D., born at Aberdeen in 1753, studied medicine at Edinburgh, and in 1776 was appointed professor of the institutes of medicine. In 1780–82 he published his Conspectus Medicinæ Theoreticæ; in 1790 became professor of the practice of physic, and in 1792 issued his Philosophical and Literary Essays. He died in 1821.

Gregory, JOHN, M.D., physician, grandson of James Gregory, the inventor of the reflecting telescope. He was born 1724, and was successively professor of philosophy and medicine in King's College, Aberdeen, and of the practice of physic at Edinburgh. His works include Elements of the Practice of Physic, a Comparative View of the State and Faculties of Men and Animals, and A Father's Legacy to his Daughters. He died in 1773.

Gregory, OLINTHUS GILBERT, mathematician, born in Huntingdonshire in 1774. At nineteen he published a volume of Lessons, Astronomical and Philosophical, and was afterwards in turn sub-editor of a newspaper at Cambridge, bookseller, and teacher of mathematics. In 1801 he became mathematical master in the Royal Military Academy at Woolwich, and published a treatise on astronomy and several mathematical works, of which his Treatise on Mechanics was of most importance. His Letters on the Evidences and Doctrines of the Christian Religion (1810), and a Life of the Rev. Robert Hall (1833), were his chief miscellaneous writings. He died in 1841.

Gregory of Nazianzus (*Gregorius Nazianzēnus*), a father of the Greek Church, born near Nazianzus, in Cappadocia, between 318 and 329; studied at Athens, and in 355 and 356 taught rhetoric in that city. He afterwards retired for some time with Basil to the Desert of Pontus. He began to preach in 362, and between 365 and 374 was associated with his father in the bishopric of Nazianzus. He went to Constantinople about 378 or 379 to oppose the Arians, and was appointed bishop of that see by Theodosius in 380, but in the following year retired to his former charge of Nazianzus. He died in 389 or 390. His works consist of letters, sermons, and poetry. His eloquence is nearly on a level with that of Basil and Chrysostom. His festival is on 9th May.

Gregory of Nyssa, a father of the Greek Church, brother of St. Basil, born at Sebaste, Pontus, about 332; died about 398. By his brother's influence he was made Bishop of Nyssa, in Cappadocia. Having opposed the Arians, he was banished at their instigation by Valens from 375 to 378. He took a prominent part in the Councils of Constantinople from 381 to 394. His festival is on 9th March. His works consist of dogmatic treatises, Scripture commentaries, sermons, letters, &c.

Gregory of Tours (*Gregorius Florentius*), historian of Gaul, born in Auvergne in 539 or 544; died at Tours in 595. He became Bishop of Tours in 573. He had the courage to oppose Chilperic and Fredegonde in their violent courses, and acted the part of a peacemaker in the dynastic quarrels of the period. His Historia Francorum is a valuable chronicle of 6th century events.

Gregory Thaumaturgus, SAINT, born in Pontus about 210 A.D.; became a Christian at an early age, and was a disciple of Origen; was bishop of Neocæsarea, from 244 till his death in 270. His life and miracles are narrated by Gregory of Nyssa.

Gregory the Illuminator, SAINT, the apostle of Armenia, born about 258 A.D. From 302 to 331 he was patriarch of the Armenian church, but the last years of his life were passed as a hermit. He died about 342.

Gregory's Mixture, a popular stomachic and aperient medicine, consists of two parts of rhubarb, four of calcined magnesia, and one of ginger. It may be used with benefit occasionally, but not systematically.

Greifenberg (grī'fn-ber*h*), the name of several places in Prussia, particularly a walled town, province of Pomerania, government of Stettin. Pop. 5634.

Greifenhagen (grī'fn-hä-gėn), a town of Prussia, province of Pomerania, government of Stettin. It has manufactures of woollen and linen cloth. Pop. 6605.

Greifswald (grīfs'vält), a town of Prussia, province of Pomerania, on the navigable river Rick, about 3 miles above its entrance into the Baltic. It contains a university, founded in 1456, attended by about 600 students, and possessed of a library (100,000 vols.), museum, observatory, &c. It has manufactures of machinery, oil, paper, and tobacco; and a considerable shipping trade. Greifswald was one of the Hanse towns about 1270; was assigned to Sweden by the Peace of Westphalia, 1648; was occupied successively by various northern powers, and finally ceded to Prussia in 1815. Pop. 20,345.

Greiz (grīts), a town, Germany, principality of Reuss Greiz, in a valley on the right bank of the Elster, 16 miles south of Gera. It is the residence of the elder branch of the Reuss family; is walled, well built, and has a castle and palace. Pop. 17,288.

Grena'da, one of the British West Indian Islands; about 85 miles north-west of Trinidad; oblong in form, 24½ miles long, N. and S., and 10 miles broad; area 133 square miles. The island is traversed north to south by an irregular mass of volcanic mountains, attaining elevations of 3000 and 3200 feet above sea-level, and having lateral branches of lower hills. The valleys between these contain alluvial tracts of great fertility. On the south-east coast there is a considerable extent of unhealthy, low, swampy ground. In the centre of the island, about 1700 feet above sea-level, there is a circular lake, 2½ miles in circumference, inclosed by lofty mountains. Rivers and rivulets are numerous; and most of the former capable of working sugar-mills. The climate is oppressively hot on the low lands, but cool and pleasant on the hills. Sugar was formerly the chief article of cultivation; but at present cocoa stands by far the first among the exports. The island has a lieutenant-governor, and a local legislature consisting of a nominated council and a house of assembly of seventeen elected members. The capital is St. George Town. Grenada was discovered by Columbus in his third voyage in 1498, and colonized about the middle of the 17th century by the French, who exterminated the Caribs. In 1762 it was taken by the British, and though recaptured by the French in 1779 was restored to Britain in 1783. Pop. 56,413, of whom 2118 were coolies, and about 800 whites.

Grenade, a small hollow bullet or ball of iron or other metal, or annealed glass, about 2½ inches in diameter, filled with gunpowder, and fired by a fuse, so as to cause it to burst when thrown among the enemy. The term was first used by Du Billey, in reference to the siege of Arles (1536). Until about the end of the 17th century, when musketry became common, soldiers of the line were trained to throw grenades by the hand, hence the name *grenadier*. See the following article.

Grenadier, originally a soldier destined to throw the hand-grenades. Soldiers of long service and acknowledged bravery were selected for this service, so that they soon formed a kind of *élite*. There were at first only a few grenadiers in each regiment. Companies of grenadiers were formed in France in 1670, in England a few years later. With the development of the musket the name soon became only a *souvenir* of the ancient practice; the troops so called generally formed one battalion of a regiment, distinguished by the height of the men and a particular dress, as, for instance, the high

bear-skin cap. With the British and French the grenadier company was the first of each battalion. The name in the British army remains only in the regiment of Grenadier Guards.

Gren'adine, a thin gauzy silk or woollen fabric, plain, coloured, or embroidered, used for ladies' dresses, shawls, &c.

Gren'adines, a chain of small islands and rocks, West Indies, between the islands of Grenada and St. Vincent; principal island, Carriacou. They produce coffee, indigo, cotton, and sugar. Pop. about 7000.

Greno'ble, a fortified town of southern France, capital of dep. Isère, finely and strongly placed on the Isère, 60 miles S.E. Lyons, on both sides of the river, which is crossed by three bridges, and lined by fine quays. It has a cathedral, and a noteworthy church (Saint-André), with the tomb of Bayard; a public library of 170,000 volumes and 7500 MSS.; a college, museum, bishop's palace, court-house, arsenal, and extensive public gardens. The manufactures consist of gloves, linen goods, liqueurs, leather, &c. Grenoble existed in the time of Cæsar; and Gratian, who had improved it, changed its name from Cularo to Gratianopolis (whence *Grenoble*). Pop. 56,878.

Grenville, George, a British minister, younger brother of Earl Temple, and father



George Grenville.

of William Wyndham the first Lord Grenville; born in 1712; died in 1770. He became treasurer of the navy in 1754; secretary of state and subsequently Irish lord of the admiralty in 1762; first lord of the treasury and chancellor of the exchequer in 1763. In 1763 he introduced a scheme of colonial taxation, and in 1764 proposed a stamp tax to be levied in the American colonies, which was one of the causes of the American war of Independence. In 1765 he was succeeded in office by Lord Rockingham. The Grenville Papers (1852–53) contain his most important political correspondence.

Grenville, Sir Richard, one of England's naval heroes, a cousin of Sir Walter Raleigh, born about 1541. After performing such public duties as fell to a man of his position, and having distinguished himself in naval exploits against the Spaniards, in 1591 he was in command of the *Revenge* of 500 tons and 250 men, as vice-admiral under Lord Thomas Howard, who was sent to the Azores for the purpose of intercepting homeward-bound Spanish treasure-ships. Suddenly the Spaniards appeared with an overwhelming force of men-of-war, and Howard seeing that resistance was useless, gave the enemy the slip. Sir Richard, however, was cut off from his countrymen, either by his own intention or accidentally, and instead of surrendering determined to fight to the last. For fifteen hours he kept up a desperate resistance, and when at last the *Revenge* was reduced to a helpless wreck the sorely wounded hero and the remnants of his gallant crew were overpowered and taken prisoners. Sir Richard died within two or three days on board one of the Spanish vessels, and soon after the *Revenge* went down in a great storm. Tennyson's grand ballad of The Revenge is well known.

Grenville, William Wyndham, Lord, third son of George Grenville, was born 1759. In 1783 he was appointed paymaster-general of the army; in 1789 became speaker, and in the same year became secretary of state for the home department. In 1790 he was created Baron Grenville, and from 1791 till Pitt's resignation in 1801 held the post of foreign secretary. On the return of Pitt to office in 1804 he declined to join him, and continued in opposition till Pitt's death, when he became the head of a coalition ministry, including Fox and Grey, 1806. This ministry resigned in 1807, after having passed an act for the abolition of the slave-trade. He did not again take office. He died in 1834.

Gresham, Sir Thomas, a merchant of London, born in 1519. In 1552 he was sent as agent of Henry VIII.'s money affairs to Antwerp, where in two years he paid off a heavy loan, and raised the king's credit considerably. On the accession of Elizabeth,

he was deprived of his office, but it was soon restored to him, with that of queen's merchant, and he was also knighted. In 1556 he planned and erected at his own expense an exchange (afterwards called by Elizabeth the Royal Exchange) for the merchants of London, in imitation of that of Antwerp. He founded in 1575 Gresham College, London (in which courses of lectures are given), and at his death in 1579 set aside large sums for charitable institutions.

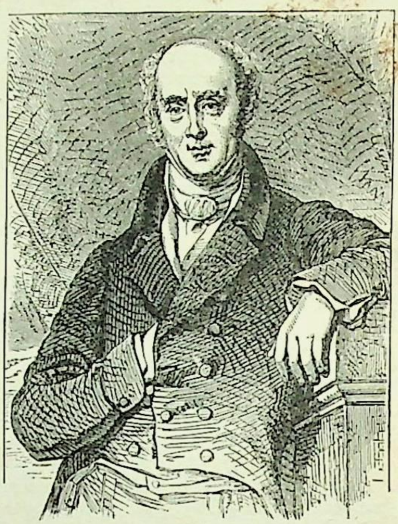
Gresset (grā-sā), Jean Baptiste Louis, a French poet, born at Amiens, 1709. At the age of twenty-four he produced a small poem full of graceful badinage called Vert Vert, the subject being the adventures of a parroquet. It was followed by other pieces in a similar style. He died in 1777.

Gretna Green, a village of Scotland, in Dumfriesshire, on the Solway Firth, 8 miles north of Carlisle, for nearly a century notorious for the celebration of the marriages of fugitive lovers from England. To conclude a lawful (though irregular) marriage in Scotland, it is only necessary for an unmarried couple to go and declare themselves man and wife before witnesses, and it was in this way that these runaway couples were married; but such marriages were put an end to in 1856, by an act declaring that no irregular marriage in Scotland shall be valid unless one of the parties has resided in Scotland for twenty-one days next preceding such marriage.

Greuze (greuz), Jean Baptiste, a famous French painter, born in Burgundy, 1726. Although he devoted some time and attention to historical subjects, he latterly confined himself to depicting scenes of the family life of the *bourgeois* or middle class. As a colourist he occupies a high place. He died in 1805.

Greville, Sir Fulke, Lord Brooke, English writer; born in 1544. Having studied at Cambridge and Oxford and made the tour of Europe, he became a courtier, and enjoyed the favour of Elizabeth, James I., and Charles I. In 1628 he was stabbed by an old servant, and immediately expired. He wrote the life of Sir Philip Sidney; Cælica, a collection of 109 songs; Alaham and Mustapha, two tragedies, &c.

Grey, Charles, Earl, English statesman, eldest son of Charles, first Earl Grey; born in 1764; died in 1845. He was educated at Eton and at King's College, Cambridge. In 1786 he was returned to parliament as member for Northumberland. On the accession of the Grenville ministry in 1806, Grey, now Lord Howick, was made first lord of the admiralty, and on the death of Fox succeeded him as secretary for foreign affairs and leader of the House of Commons. The death of his father in 1807 raised him to the



Earl Grey.

House of Peers, and from this period up to 1830 he headed the opposition in the Lords, and especially opposed the proceedings against Queen Caroline. On the accession of William IV. and the retirement of the Wellington ministry, Earl Grey was summoned to office. The great event which marks his administration is the passing in 1832 of the first reform bill. In 1834 Earl Grey resigned, and was succeeded by Lord Melbourne. The remainder of his life was chiefly spent in retirement.

Grey, Lady Jane, an interesting figure in English history, the daughter of Henry Grey, marquis of Dorset, afterwards duke of Suffolk, by Frances, daughter of Charles Brandon, duke of Suffolk, and Mary, younger sister of Henry VIII., in whose reign Lady Jane was born, in 1537. She displayed much precocity of talent; and under the tuition of Aylmer, afterwards bishop of London, she acquired a knowledge of the learned languages, as well as French and Italian. She was married to Lord Guildford Dudley, fourth son of the Duke of

Northumberland, in 1553. Edward VI., who died in 1553, was induced on his death-bed to settle on her the succession to the crown. The council endeavoured to keep his death secret, with a view to secure the persons of the princesses, Mary and Elizabeth, and when Mary discovered the design the council proclaimed Lady Jane queen. On the approach of Mary, however, the council deserted Lady Jane, and Mary was proclaimed queen. Jane was now confined to the Tower. She and her husband were arraigned, and pleaded guilty of high treason; but their doom was suspended, and it was not until after the suppression of the rebellion of Sir Thomas Wyatt, in which the Duke of Suffolk, Lady Jane's father, had participated, that the sentence was executed. She was beheaded on Tower Hill, February 12, 1554, her husband having previously suffered the same day.

Grey Friars. See *Franciscans.*

Greyhound, a variety of dog, distinguished by a greater length of muzzle than any other; very low forehead, short lips, thin and long legs, small muscles, contracted belly, and semipendent ears. There are several varieties, as the Irish greyhound, the Scottish, the Russian, the Italian, and the Turkish. The common greyhound is of an elegant make of body, and is universally known as the fleetest of dogs. A good hound has a fine, soft, flexible skin, with thin, silky hair, a great length of nose, contracting gradually from the eye to the nostril, a full, clear, and penetrating eye, small ears, erect head, long neck, chest capacious, deep, but not wide, shoulders deep and placed obliquely, ribs well arched, contracted belly and flank, a great depth from the hips to the hocks of the hind-legs, fore-legs straight, and shorter than the hinder. The name appears to have no reference to the colour, but is derived from the Icelandic *grey*, a dog. They are chiefly used in the sport of coursing, a work for which their peculiar shape, strength, keenness of sight and speed make them exceedingly well fitted. This sport is preferred by many to horse-racing, and large kennels of greyhounds are kept by several of the nobility and gentry, who also further the sport by preserving hares, and providing suitable coursing grounds. (See *Coursing.*) The chief breeds are the Newmarket, the Lancashire, and the Scotch.

Greytown, San Juan de Nicaragua, or San Juan del Norte, the principal seaport of the Central American republic of Nicaragua, situated at the mouth of the San Juan. Pop. 1500.

Greywacke. See *Graywacke.*

Griesbach (grēs'bȧh), Johann Jacob, a German biblical critic, born in 1745, died in 1812. He studied at Frankfort, Tübingen, Leipzig, and Halle. In the latter university he appeared as a lecturer in 1771, and after being appointed professor of theology at Jena, he published his famous edition of the New Testament, in which are indicated the various readings and their respective degrees of probability.

Griffin, or Gryphon, a fabulous monster of antiquity, also common in heraldry, commonly represented with the body, the feet, and claws of a lion, and the head and wings of an eagle. India, or Scythia, was anciently assigned as the native country of the griffins; and it was alleged that they guarded the gold in the mountains.

Griffiths' Valuation, so called from Sir Richard Griffiths, who, in accordance with an act of parliament, superintended, between 1830 and 1840, the valuation of the land of Ireland for purposes of taxation. Previous to 1881 rents were generally about 30 per cent above it.

Grillparzer (gril'pär-tsėr), Franz, a German poet and dramatist, born at Vienna, 15th January, 1791. Having entered the service of the imperial court, he rose through various dignities, and at last was appointed member for life of the imperial council. He was the author of lyrical and other poems, a novel, travels, &c., and of the dramas Sappho, Das Goldene Vliess, Des Meeres und der Liebe Wellen. Perhaps the finest of his productions is the historical drama of König Ottokar's Glück und Ende. He died at Vienna in 1872.

Grilse, name given to the young of the salmon (smolts) after they return for the first time from the sea to fresh water. They then sometimes weigh from 5 to 8 or 9 lbs.

Grimal'di Family, one of the four families of the high nobility in Genoa. The lordship of Monaco belonged, for more than 600 years (beginning with 980), to the Grimaldi, and the ruler is still a Grimaldi. With the Fieschi they always played an important part in the history of Genoa, especially in the disputes between the Ghibellines and the Guelfs, to which latter party both families belonged.

Grimaldi's Fringes, a term in optics given to the coloured bands observed when a beam of light passing through a narrow slit falls

on a screen. They are due to interference of the luminous waves, and are named from Francesco Maria Grimaldi, who wrote a treatise on the subject. See *Diffraction*.

Grimm, FRIEDRICH MELCHIOR, BARON, German man of letters, who lived mostly in Paris and wrote in French. He was born in 1723 at Ratisbon, and having finished his studies, he went to Paris and there became acquainted with Jean Jacques Rousseau, Diderot, D'Alembert, D'Holbach, and other Parisian philosophers. He corresponded with Catharine II. of Russia, Gustavus III. of Sweden, and other great personages. Frederick the Great among others gave him marks of great esteem. In 1776 he was appointed envoy from the Duke of Saxe-Gotha to the French court, and honoured with the title of baron. On the revolution breaking out he retired to Gotha, where he died in 1807. His Correspondance Littéraire possesses great literary and historical value.

Grimm, JAKOB LUDWIG, a German philologist, born at Hanau in Hesse-Cassel, 1785. He was educated partly at Cassel, and finally at Marburg University. In 1806 he became librarian to Jerome Bonaparte, king of Westphalia, and from 1816 to 1829 he occupied the post of second librarian at Cassel. From 1830 to 1837 he resided at Göttingen as professor and librarian, lecturing on the German language, literature and legal antiquities. Having, along with other six professors, resisted the unconstitutional encroachments of the King of Hanover, he was banished, and after his retirement to Cassel, he was, in 1841, called to Berlin as a professor and member of the Academy of Sciences. He sat in the National Assembly of 1848, and in that of Gotha in 1849. From that time till his death, which took place at Berlin, 1863, he occupied himself only with his various publications. He wrote on German mythology, German legal antiquities, the history of the German language, and published old German poems, &c. His two greatest works, both unfinished, are his Deutsche Grammatik (German Grammar, vols. i.—iv., 1819–37), and his Deutsches Wörterbuch (German Dictionary) commenced in 1852, in conjunction with his brother Wilhelm, and being gradually completed by eminent scholars. He also published, in company with his brother, the Kinder- und Hausmärchen, one of the most popular collections of juvenile fairy tales.

Grimm, WILHELM KARL, brother of the preceding, born 1786, was educated at Cassel and Marburg, and in 1830 he followed his brother to Göttingen, and obtained a professorship. He joined in his brother's protest against the abrogation of the new Hanoverian constitution, and was deprived of his office. Having obtained an appointment in Berlin, he died in that city in 1859. He devoted himself especially to the German mediæval poetry, and published a treatise, Ueber die deutschen Runen, a translation of Altdänische Heldenlieder, Balladen und Märchen, &c., all with valuable introductions and disquisitions.

Grimma, a town, Kingdom of Saxony, on the Mulde, 17 miles E.S.E. of Leipzig, charmingly situated, and with some interesting old buildings. Pop. 8292.

Grimm's Law, so called from its discoverer, Jakob Grimm, formulates the principle of the interchange of the mute consonants in the Aryan languages, in words derived from the same roots. For example: *p*, *b*, and *f* in Latin, Greek, and Sanskrit are in Gothic and English, Dutch, &c., respectively represented by *f*, *b*, and *b*, and in Old High German by *b* (*v*), *f*, and *p*. The subjoined table exhibits the principal mutations:—

	Labials.	Dentals.	Gutturals.
Greek (Latin, Sanskrit)	*p, b, f*	*t, d, th*	*k, g, ch*
English (A. Sax.), Gothic, &c.	*f, p, b*	*th, t, d*	*h, k, g*
Old High German	*b* (*v*), *f, p*	*d, g, t*	*g, ch, k*

As examples:—E. *father* = L. *pater*, Gr. *patēr*, Skr. *pitri;* E. *brother* = L. *frater*, Gr. *phratēr*, Skr. *bhratar;* E. *kin* = *genus*, Gr. *genos;* E. *head*, A. Sax. *heafod* = L. *caput*, Gr. *keph*(*alē*), &c.; E. *thin* = L. *tenuis*, Gr. *tanaos*. Certain exceptions to the law are explained by a law subsequently discovered, called Verner's law. See *Philology*.

Grimsby, GREAT, a parl. and mun. borough and thriving seaport, England, county of Lincoln, on the Humber. The docks occupy an area of about 140 acres, and there is a large trade with continental ports. Grimsby is one of the most important fishing ports of the kingdom. It sends a member to the House of Commons. Pop. mun. bor. 51,934; parl. bor. 58,661.

Grimsel (grim'zl), a pass in Switzerland at the eastern extremity of the Bernese Alps, 7103 feet in height, and connecting the valleys of the Aar and the Rhone.

Grindelwald (grin'dl-vȧlt), one of the most beautiful of the upper Alpine valleys of Switzerland, about 36 miles south-east of

Berne, containing two immense glaciers. The village of Grindelwald consists of picturesque cottages, and the inhabitants, about 3500 in number, are chiefly employed in rearing cattle.

Grinding, a mechanical process in which certain effects are produced by attrition. This process prevails in various mechanical arts, as in grinding corn, &c., the object of which is to reduce the materials to a fine powder; or in grinding metals for the purpose of giving them a certain figure, polish, or edge. In the first case the grinding or crushing is effected by rough stones, or, as in crushing ores, between heavy metal cylinders, or by a heavy stone or iron cylinder revolving upon a smooth plate. (See *Mill.*) The grinding of cutlery is effected by means of the grindstone (see below); emery powder grinds glass lenses and specula. Ornamental glass is ground into facets by stones and lap-wheels. Diamonds and other precious stones are ground with diamond dust. What is called *dry grinding* is the grinding of steel with dry grindstones. The points of needles are produced by this means, also the finishing of steel pens. Sand-jet grinding is a process in which abrasion is effected by the percussion of small hard particles on a plain surface, sharp siliceous sand being impelled by a blast artificially produced of steam or of air. By the use of flexible jointed connecting tubes the jet can be turned in any direction.

Grindstone, a cylindrical stone, on which sharpening, cutting, and abrasion are effected by the convex surface while the stone is revolving on its axis. They are made of sandstone, or sandstone grit of various degrees of fineness. Good stones are obtained in various parts of England, especially from the coal districts of Northumberland, Newcastle grindstones being especially famous. The Sheffield grindstone, used for grinding files and the like, is obtained from Hardsley, about 14 miles north of Sheffield. Artificial grindstones have been successfully tried.

Gripes, a painful affection of the bowels, caused by constipation or diarrhœa. In such cases, if spasms occur, the term 'colic' is applied.

Griqualand East, a region of South Africa, formerly known as No Man's Land, lying south of Natal between Pondoland and Basutoland. It was incorporated with Cape Colony in 1874. Area, 7480 sq. miles. Population about 153,000.

Griqualand West, a district of South Africa north of the Orange River, and west of the Orange River Colony; 180 miles from east to west, and 120 from north to south; area, about 17,800 sq. miles. The prevailing character of the surface is that of undulating grassy plains suitable for grazing. Previously to the discovery of the diamond fields in the basin of the Vaal River, Griqualand was little known. In 1870 large finds of diamonds in that district began to attract wide notice, and in 1871 Waterboer, the Griqua chief, ceded all his rights to the British government, and the territory was incorporated with Cape Colony. The chief centre of the diamond-mining industry, and the seat of government, is Kimberley (pop. 30,000). The annual value of the mines sometimes reaches £4,000,000. The Griquas are a mixed race sprung from the intercourse of the Boers with their Hottentot slaves. Pop. estimated at 84,000.

Grisi (grē'sē), GIULIA, a celebrated Italian vocalist, born at Milan 1811 or 1812. After having studied music at Bologna, and made her *début* in Rossini's Zelmira, she appeared at Milan as Norma. She acquired great celebrity at Paris, in England, and America. She subsequently married Mario, the great tenor singer. Her voice gave way in her later years, and she died at Berlin 1869. Her principal character was Norma.

Gris-Nez (grē-nā), CAPE, a headland, north-west extremity of France, dep. Pas-de-Calais, the nearest point of the French shore to that of Britain, the distance being barely 21 miles. It has a revolving light, 195 feet high.

Grisons (grē-sōn; Ger. *Graubünden*), the largest and most easterly canton of Switzerland, bordering on Austria and Italy; area, 2773 sq. miles. Its boundaries and interior consist almost entirely of mountain chains, including more than twenty peaks above 9000 feet. The canton may be regarded as embracing three great valley districts, of which the Upper and Lower Engadine (Inn valley) attain considerable breadth. The Inn, which flows to the Danube, and the Vorder and Hinter Rhine, are the principal rivers. The lakes are numerous, and many of them present scenery of the most magnificent description. The climate varies greatly, ranging from the perpetual winter of the mountains to the almost Italian air of some of the valleys. The canton is in general pastoral, feeding large numbers of cattle and sheep. The mountain forests supply much timber. A considerable transit

trade is carried on between Italy and Germany. The canton was admitted into the Confederation so late as 1803. Both the Protestant and the Roman Catholic religion are established. The language of the public acts is German, and the people speak German, Romansch, or Italian. Pop. 94,991.

Griswold, RUFUS WILMOT, D.D., American writer, born in Vermont, 1815. After having travelled extensively both in his own country and in Europe, he became successively a printer, a Baptist preacher, and a journalist. He was the author of The Poets and Poetry of America, &c. He was one of the editors of Edgar A. Poe's works. He died in 1857.

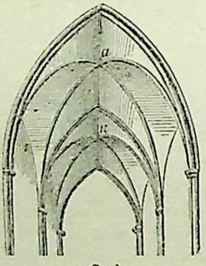
Grit is a sandstone, coarse-grained, with particles more or less angular, connected by a cement of a hard siliceous nature.

Grivegnée (grēv-nyā), a town in Belgium, province of Liége, on the Ourthe. It manufactures steam-engines, and has worsted and fulling mills. Pop. 7500.

Groat, an English silver coin, coined by Henry III. in 1249, and by Edward III. 1351. It was equal to fourpence in value. A coin of this value, the *fourpenny-piece*, was revived in 1835, but none have been struck since 1856, and all are now withdrawn from circulation.

Groats, the seeds of oats prepared as an article of food by being deprived of their hulls. They are much used in the preparation of gruel for invalids.

Grodno, a town, Russian Poland, capital of the government of same name, on the Niemen, 160 miles north-east of Warsaw, a poorly-built place, the principal edifice being a palace erected by Alexander III. The manufactures consist of woollen, linen, and silk goods, firearms, &c. Pop. 49,788.—The government has an area of 14,931 sq. miles, largely occupied by pine forests and swamps. Pop. 1,321,157.



a a, Groins.

Groin, the angular curve made by the intersection of two semi-cylinders or arches. It is either regular or irregular:—*regular*, as when the intersecting arches are of the same diameters and heights; and *irregular*, when one of the arches is semicircular, and the other semi-elliptical. In Gothic architecture groins are always ribbed.

Gromwell, the name of plants of the genus *Lithospermum*, nat. order Boraginaceæ, containing a number of widely distributed species, three of which are natives of Britain. The seeds of *L. officinale* are occasionally used as a diuretic.

Groningen (grō'ning-en), a town of Holland, capital of a province of same name, situated on the river Huns here converted into a canal, 92 miles north-east of Amsterdam. It is a rich place, adorned with many excellent buildings, and has numerous canals crossed by bridges. The principal edifices are the cathedral, a fine exchange, and the university. It has manufactures of white lead, soap, &c., oil, fulling, and saw mills, and an excellent harbour, with an active trade. Pop. 59,679.—The province forms the north-eastern portion of Holland; area, 790 sq. miles. It is protected against the encroachments of the sea by dykes, is very level, and is intersected by innumerable canals. The inhabitants, 268,198, nearly all belong to the Calvinistic Church.

Grono'vius (properly *Gronov*), the name of several Dutch classical scholars:—(1) JOHANN FRIEDRICH, born at Hamburg in 1611, succeeded Daniel Heinsius as professor of belles-lettres at Leyden (1658), and died there 1671. His editions of Livy, Statius, Justin, Tacitus, Gellius, Phædrus, Seneca, Sallust, Pliny, Plautus, &c., are valuable.—(2) His son JAKOB, born at Deventer in 1645, studied there and at Leyden. He afterwards became professor of belles-lettres at that university, and died in 1716. He edited Tacitus, Polybius, Herodotus, Pomponius Mela, Cicero, Ammianus Marcellinus, &c., and compiled a Thesaurus Antiquitatum Græcarum (Leyden, 1697, thirteen vols. fol.).—(3) His son ABRAHAM, born at Leyden 1694, edited Justin, Pomponius Mela, Tacitus, and Ælian. He died at Leyden in 1775.

Groote Eylandt (grō'te ī'lant; 'great island'), the largest island in the Gulf of Carpentaria, north of Australia, belonging to the colony of S. Australia; greatest length and breadth 40 miles each.

Gros (grō), ANTOINE-JEAN, BARON, a French historical painter, born at Paris in 1771. He studied art under David, and subsequently became a staff officer in the French army. In this position he produced his picture of the Victor of Arcola, by which he secured the favour of Napoleon.

In 1804 he produced his Plague at Jaffa, with Napoleon visiting the sick, a work which was crowned at the Louvre. He painted various battle scenes; but his chief work is probably the Cupola of St. Geneviève at Paris, exhibiting the saint protecting the throne of France, represented by Clovis, Charlemagne, St. Louis, and Louis XVIII. The artist received for it 100,000 francs and the title of baron. The rise of the romantic school deprived him of his popularity, and he drowned himself in the Seine in 1835.

Grosbeak, a general popular name for birds of at least three groups belonging to the conirostral division of the Insessores. The first comprises the cross-bills; in the second group is the East Indian representative genus *Paradoxornis*, with the beak large and parrot-like, but not crossing; the third group includes the pine grosbeak (*Pinicŏla enucleātor*) and the bullfinch. The term grosbeak was given to birds which had beaks proportionally larger than in the most familiar forms.

Groschen (grō'shen), a name for German coins of which the oldest known were struck in Trèves in 1104. In 1525 the groschen was divided into twelve pfennige. Latterly, in the currency system existing up till 1872, the groschen was a silver coin = $1\frac{1}{5}d.$ sterling, there being 30 to the *thaler* of about 3*s.* sterling.

Grose, Francis, an English antiquary, born in 1731. Having dissipated the fortune inherited from his father, he turned his attention to the study of antiquities. In 1773 he commenced the publication in numbers of his Views of Antiquities in England and Wales. In 1789 he made a tour in Scotland for the purpose of illustrating the antiquities of that country. Before completing it, however, he proceeded to Ireland, with the view of collecting its antiquities, but was suddenly carried off by apoplexy in 1791. His name is now perhaps chiefly remembered from his connection with Burns, who wrote his Tam o' Shanter for him. Captain Grose also wrote a Treatise on Ancient Armour and Weapons, a Classical Dictionary of the Vulgar Tongue, and other publications.

Gross, in opposition to *net*, is applied to merchandise, including the weight of that in which it is packed. Thus we say, 'The bag of coffee weighs 9 cwts. *gross*,' that is, including the weight of the bag.

Grossenhain (grōs'en-hīn), a town, kingdom of Saxony, 20 miles N.W. of Dresden, on the left bank of the Röder. Woollen and cotton goods, &c., are manufactured. Pop. 11,544.

Grosseteste, Robert, an eminent English scholar and prelate, was born about the year 1175, studied first at Oxford, and then went to Paris, where he mastered the Hebrew and Greek languages. On his return to England he became lecturer in the Franciscan school at Oxford, and acquired a great reputation for his linguistic abilities, his skill in logic, &c. In 1235 he was appointed Bishop of Lincoln, but soon came into collision with Pope Innocent IV. on the question of the induction of foreigners into English benefices. He refused to institute the pope's nephew, Frederick di Lavagna, to a canonry at Lincoln, and disregarded the papal fulminations which he thus incurred. He died in 1253. His writings, few of which have been published, are very voluminous.

Grosse'to, a province of Tuscany, Italy; area, 1712 sq. miles; pop. 114,295. Being mountainous and marshy it is little adapted for cultivation. Its capital, Grosseto, on the Ombrone, is the seat of a bishop, and has a beautiful cathedral. Pop. 7371.

Grossula'ceæ, Grossulariaceæ, a tribe of plants of the nat. order Saxifragaceæ, comprehending the gooseberry and currant of gardens, and consisting, in fact, of only one genus, Ribes; natives of most parts of the world except Africa and the tropics.

Grosswardein (grōs'vär-dīn), a royal free city of Hungary, capital of county Bihar, in a beautiful plain, on the Körös. It consists of the town proper, formerly fortified and surrounded by walls, and of extensive suburbs, is tolerably well built, and is a railway centre. The staple manufacture is earthenware. Pop. 38,219.

Grosvenor Gallery (grō've nor), a building erected in 1877 by Sir Coutts Lindsay in New Bond Street, London, for annual exhibitions of pictures. In these exhibitions preference was generally given to certain schools of art, represented by such names as Burne Jones, Rossetti, &c., and in general to work appealing more to a peculiar æsthetic taste than to the popular mind.

Grote, George, English historian and politician, was born in 1794, died in 1871. His grandfather, descended from German ancestors, was one of the original partners of the London banking-house of Prescott, Grote, & Co. Having been educated at

Sevenoaks and at the Charterhouse, he entered in 1810 as a clerk in his father's banking establishment. As early as 1823 he began to collect materials for his History of Greece. In 1832 he was elected a member of parliament for the city of London, and his subsequent parliamentary career, until his retirement in 1841, was principally devoted to the advocacy of vote by ballot. He was also a leader of the 'Philosophic Radicals.' In 1846 appeared the first two volumes of his History of Greece. The remaining ten volumes followed in rapid succession, the final volume being published in 1856. The work terminates with the death of Alexander the Great, and as a whole is a monument of erudition. In 1865 he published Plato and the Other Companions of Sokrates, and was engaged at the time of his death on an elaborate treatise on Aristotle and the Peripatetics. In the latter part of his life he was concerned in the management of University College, the London University, and the British Museum.

Grotesque, in art, a capricious variety of arabesque ornamentation, which, as a whole, has no type in nature, the parts of animals, plants, and other incongruous elements being combined together; used by the Romans in decorative painting and revived by the artists of the Renaissance.

Grotius, or DE GROOT, HUGO, a Dutch scholar, born at Delft, 1583. He entered the University of Leyden when only eleven, was a pupil of J. J. Scaliger, under whose supervision he edited Marcianus Capella and the Phenomena of Aratus. In his fifteenth year he graduated, and in the year after he accompanied the Dutch ambassador to France. Having sided with the party of the Remonstrants, Grotius was condemned to perpetual imprisonment by the opposite and successful party, but he escaped. Louis XIII. granted him a pension, subsequently withdrawn. After several vicissitudes he went to Stockholm, entered the service of Queen Christina, and was appointed ambassador to France in 1635. He died at Rostock in 1645. His greatest work is De Jure Belli et Pacis (1625), on the fundamental principles of international law. He also wrote on the history of the Low Countries, Annotations on the Old and New Testaments, &c.

Grouchy (grö'shē), EMMANUEL, MARQUIS DE, a noted French general, born at Paris, 1766. He entered the Royal Life Guards at the age of fourteen, saw much service, and highly distinguished himself. In the war with Prussia in 1806, and Russia (1807), and at Wagram, he acquired increased renown. In 1815 he defeated Blücher at Ligny. Having been ordered to follow the Prussian retreat, he was unable to aid Napoleon at Waterloo. He was banished under the second restoration, and lived for a few years at Philadelphia. He returned to France in 1821, and died in 1847.

Ground, in painting, the first layer of colour. The Italian school preceding and during the time of Raphael employed white grounds, but afterwards, when canvas had superseded panels, the Italian and Spanish schools adopted an oil ground of a dull red colour. The Dutch and Flemish masters used light grounds varying from white to gray, and their example has been followed by the English painters and those of the modern European schools.

Ground-annual, in Scottish law, the rent paid for a piece of ground that is built upon to one who holds the ground in feu. It may thus be a perpetual annuity. A vendor often prefers a ground-annual to a lump sum. It is similar to the English term *Ground-rent*.

Ground Dove, a name of various species of pigeons, which resemble the gallinaceous birds in living mainly on the ground, their feet being better suited for walking than perching. The name is especially given to the members of the genus *Chamæpelia*, small birds belonging to the warmer parts of America, and includes the bronze-wing pigeons of Australia. The large pigeons of the genus *Goura* (the crowned pigeons) are also so called. See *Goura*.

Ground-hog. Same as *Aard-vark.*

Ground Ivy, *Glechōma hederācĕa*, a common British plant of the order Labiātæ, with a creeping stem and purple flowers. Tea made from it is used by the poor for pectoral complaints. It was formerly employed to flavour ale.

Ground-nut, a term which denotes the seeds or pods of the *Arăchis hypogæa*, or the tubers of certain umbellifers (earth-nuts). The *Arăchis hypogæa* is a leguminous annual of diffuse habit, with hairy stem, and abruptly pinnate leaflets. The nut or pod is situated at the end of a stalk of some length, and is ripened under ground, this stalk having the peculiarity after flowering of bending down and pushing the fruit into

the earth. The plant is extensively cultivated in tropical countries. The nuts have a flavour similar to almonds, and yield an



Ground-nut (*Arăchis hypogæa*).

oil that may be used for olive-oil. See also *Earth-nut*.

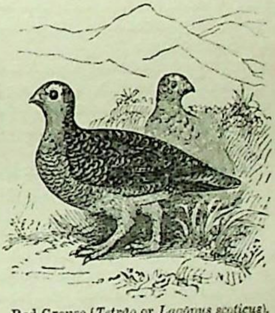
Ground-pine (*Ajūga Chamæpitys*), a herbaceous labiate plant, so called from its resinous smell. Also a name given to some lycopods or club-mosses.

Ground-rent, in English law, is the rent paid to a landowner by a person for the use of ground on which buildings are erected. The usual arrangement is for a specified time, generally ninety-nine years. On the expiry of this period the whole of the buildings become the property of the ground-landlord.

Groundsel (*Senecio vulgāris*), a European weed belonging to the nat. order Compositæ. The plant is emollient, has a slightly acid taste, but is rejected by almost every quadruped except the hog and goat; small birds, especially cage-birds, however, are very fond of the seeds.

Ground Squirrel, the name of squirrels of the genus *Tamias*, somewhat resembling the marmot. They differ from the common squirrel in possessing cheek-pouches, and in retreating into burrows. They are well known in America, but species are also found in Asia and Africa.

Grouse, the general name of the gallinaceous birds of the family Tetraonidæ, whose distinguishing mark is a naked band, often of a red colour, in place of an eyebrow. They are wild, shy, and almost untamable. They live in families, in forests and barren regions, and feed on berries, buds, and leaves. They are polygamous, the male abandoning the female, and leaving to her the whole care of the progeny. The eggs number eight to fourteen. The largest species is the *capercailzie* or *wood grouse*. (See *Capercailzie*.) Other British species are the black grouse, the red grouse, commonly called simply the grouse, and the white grouse or ptarmigan. The black grouse (*Tetrăo tetrix*) is about the size of a common fowl. The male has the outer feathers of the tail curved outwards, so that the tail is lyre-shaped. It chiefly lives in high and wooded situations, feeding on various kinds of berries. The female is commonly called *gray hen*. To this genus belong several species peculiar to North America, the most remarkable of which is the *pinnated grouse* or prairie hen (*T. cupīdo*), which inhabits open desert plains in particular districts of the Union. The male is furnished with wing-like appendages to his neck, covering two loose, orange sacs, capable of being inflated. Another species is the *cock of the plains* (which see). The grouse with hairy feet and which undergo seasonal change of plumage form the genus *Lagōpus*. Of these the *red grouse* (*Lagōpus scoticus*) is the most important. This bird, also called *moorfowl*, is found in great plenty in the Highlands of Scotland, also in Wales, the north of England, Ireland, and the Scottish islands. It pairs in the spring; the female lays eight or ten eggs. As soon as the young have attained their



Red Grouse (*Tetrăo* or *Lagōpus scoticus*).

full size they unite in flocks of forty or fifty, and are extremely shy and wild. This bird attracts large numbers of sportsmen every August to the Scottish moors to take part in the grand sporting campaign which follows 'the twelfth.' The *ptarmigan* or *white grouse* (*Lagōpus mutus* or *vulgāris*) is ash-

coloured in summer, but its hue changes to a pure white in winter. It is found in Scotland and in most northern regions, inhabiting the tops of mountains. See also *Hazel Grouse*, *Ruffed Grouse*, *Sand Grouse*.

Grouse Disease, an epidemic causing, at certain seasons, great destruction to the grouse species in Britain. Some attribute the disease to intestinal parasites, others regard it as an infectious febrile disorder and generally overstocking of the moors, and the too great proportion of weakly birds are looked upon as having something to do with it.

Grove, SIR GEORGE, English writer, born 1820. He was educated as a civil engineer, in which capacity he was connected with the Britannia Bridge and other important works. He was long secretary to the Crystal Palace Co., and did much for the popularizing of classical music in connection with its concerts. For some years he edited Macmillan's Magazine, and he was editor of, and a contributor to, the great Dictionary of Music, published in 1878–1889. He was also an extensive contributor to Smith's Dictionary of the Bible. He was knighted in 1883, and died in 1900.

Groves, among various ancient nations groves have been, probably on account of the mental impressions their stillness is calculated to make, considered as suitable localities for religious rites. The Hebrew word *asherah*, translated 'grove' in the authorized version of the Old Testament, seems to signify some idol or idolatrous symbol. See *Asherah*.

Growler (*Micropterus nigricans*), a freshwater fish of N. America, affording good food, called also black-bass. It emits a growling sound. See also *Grunt*.

Grub, the term applied to the soft, wormlike larvæ of coleopterous and other insects. Some species do much injury to the roots of plants, growing corn, &c.

Grubber, an agricultural implement for tearing and loosening soil, and for eradicating roots, &c. It consists of an iron framework with handles and wheels, and provided with curved *tines* or teeth. In the most approved kinds the wheels are arranged three in front, and two behind. The depth to which the teeth may penetrate is regulated by suitable mechanism.

Grugru, the larva of the *Calandra palmarum*, or palm weevil, found in the tropical parts of America. It is of the length and thickness of a man's thumb, burrows in cabbage-palms, and canes, and is, when cooked, considered a great delicacy.

Grünberg (grün'ber*h*), a town in the Prussian government of Liegnitz, Silesia, surrounded by vineyards, which produce large quantities of wine. Pop. 14,395.

Grunt, GRUNTER, an American fish of the family Hæmulonidæ, also termed *pig-fish* and *red-mouth*. The first of these names relates to the sound it emits when taken out of the water, the last to blood-red marks on the gums or lips. The Growler, found in America, also emits a grunting sound.

Grus, the genus to which the crane belongs.

Gruyère (grû-yār), a village, Switzerland, canton and 16 miles south of Fribourg, on a hill crowned by a fine old feudal castle. It gives its name to the well-known cheese made from a mixture of goats' and ewes' milk. It is firm and dry, and possesses cells of considerable magnitude.

Gryllus, a genus of orthopterous insects, embracing the house and field crickets, though some also include in it the grasshopper.

Grysbok (grīs'bok, 'grey buck;' *Antilope melanōtis*, or *Calotragus melanōtis*), a species of antelope found in Southern Africa. It attains about 3 feet in length, is 1½ feet high at the shoulder, and its colour is reddish-grey. It is hunted for the sake of its flesh.

Guacharo (gwȧ-chä'rō; *Steatornis Caripensis*), a bird of the goat-sucker family, of nocturnal habits, a native of South America, and found in great numbers in certain caves of Venezuela, Trinidad, and elsewhere. It is about the size of a common fowl, with a curved and toothed bill, wings long and pointed. Their food is principally fruits, upon which they grow so fat that the Indians destroy great numbers for the sake of their oil or clarified fat, which is transparent, inodorous, and keeps long without becoming rancid. It is called also *Oil-bird*.

Guadalajara (gwȧ-*dȧ*-lȧ-*hä*'rȧ), a town, Spain, capital of the province of same name, on the Henares, 44 miles north-east of Madrid. Substantially built, with manufactures of woollens, soap, earthenware, &c. Pop. 8503.—The province, area 7012 sq. miles, is mountainous, or forms part of an elevated plateau. Pop. 205,495.

Guadalajara, a city of Mexico, capital of the state of Jalisco, in the fruitful valley of Atemajac, on the Rio de Santiago; a large and handsome city, with a fine cathedral

(being an archbishop's see), and other good buildings; a university, a mint, convents, &c. Various manufactures are carried on, as those of silversmiths' and goldsmiths' wares, paper, leather, hats, pottery, cloth, &c. Pop. 95,000.

Guadalquivir (gwȧ-*dȧl*-kē-vēr′), a river, Spain, which rises in the frontiers of Murcia, traverses Andalusia from north-east to south-west, passing the towns of Cordova and Seville, and thereafter flowing S.S.W., falls into the Atlantic. Its course is 250 miles, of which 70 miles are navigable. It abounds with fish.

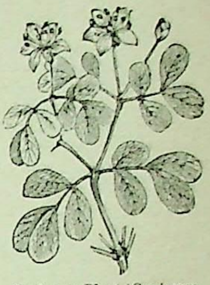
Guadeloupe (gȧ-dé-löp), one of the French West Indies, composed of two portions, separated by a narrow arm of the sea called Rivière Salée (salt river). The western and larger portion is Basse-terre, or Guadeloupe Proper, 27 miles long by about 15 miles broad. The eastern portion, called Grande-terre, is nearly 30 miles long by 10 to 12 miles broad. Guadeloupe Proper is of volcanic formation, the culminating point being La Soufrière, 5018 feet. Grande-terre, on the other hand, is generally flat, and of coral formation. Guadeloupe is watered by a number of small streams which become dry in summer. Grande-terre has only a few springs of brackish, undrinkable water. The climate is hot and unhealthy, with a remarkably humid atmosphere, and hurricanes are frequent and destructive. The soil is fertile. The chief exports (amounting annually to about £700,000) are sugar, coffee, dye and cabinet woods, pepper, manioc, tobacco, &c. The chief town is Basse-terre. Pop. 134,000, or with dependencies (Marie Galante, Desirade, &c.), 200,000.

Guadiana (gwȧ-*di*-ä′nȧ), a river of Spain, which rises in New Castile, flows first north-west, then south-west into Estremadura, and on reaching Badajoz begins to form part of the boundary between Spain and Portugal. Entering that kingdom, it finally falls into the Atlantic after a course of 400 miles, of which only 35 are navigable.

Guadix (gwȧ-*dēh′*), a town of Southern Spain, Andalusia, in the province and 31 miles E.N.E. of Granada. Said to be the first bishop's see erected in Spain, with a handsome cathedral, and a finely situated old castle, almost in ruins. Pop. 11,800.

Guad′uas, a town, republic of Colombia, remarkable as being one of the most elevated places on the globe, being 8700 feet above the sea-level. Pop. 8500.

Guaiacum (gwī′a-kum), a genus of plants, belonging to the natural order *Zygophyllaceæ*, and containing four or five arborescent species, natives of the West Indies and the tropical parts of America. *G. officinăle* has wood that is exceedingly hard, of a pale yellow colour near the exterior, and blackish brown at the heart, heavier than water, and well known under the name of *lignum-vitæ*. Among other uses it is employed in the construction of ornamental articles of furniture, being susceptible of a fine polish. This tree yields the resin known as guaiacum, which either flows spontaneously from the tree, or from incisions or perforations in the stem, or is got by extraction by means of spirit from the wood. It is greenish-brown, has a balsamic odour, taste somewhat bitter and pungent, and it dissolves freely in spirit, but is insoluble in water. Its chief use is in medicine, the resin (as well as a decoction of the bark and wood) acting as a stimulant in chronic rheumatism, and being used also in gout, scrofula, syphilis, &c.



Guaiacum Plant (*Guaiacum officinăle*).

Guaira. See *Guayra.*

Gualeguay (gwȧl′e-gwī), a town of the Argentine Republic, prov. Entre Rios, on river of same name. Pop. 10,000.

Gualegwaychú (gwȧ-le-gwī-chö′), a town of the Argentine Republic, prov. Entre Rios, on river of same name. Pop. 15,000.

Guamanga. See *Ayacucho.*

Gu′an, a gallinaceous bird of the family Cracidæ or Curassows, genus *Penelŏpē*. The sides of the head and front of the throat are naked and wattled, the wattles capable of inflation. The name Guan is more particularly applied to the *Penelŏpē cristāta*, the largest bird of the genus, measuring about 30 inches. The guans perch on trees, descending in search of grain and fruits, and are natives of Brazil and Guiana. They have been frequently carried to Europe, and with a little care would make a valuable addition to the farmer's stock of poultry in Britain.

Guanaco (gwăn-ä′kō), *Auchenia huanaco*, a South American ruminant, closely akin to the llama, alpaca, &c. It abounds most in

Chili and Patagonia, attains a height of nearly 4 feet at the shoulders, is extremely swift and sure-footed. When domesticated its flesh, wool, and milk are prized by the natives. In domestication it is of uncertain temper, and ejects saliva on those who annoy it.

Guanaha'ni. See *Cat Island.*

Guanaxuato (gwȧ-nȧ-*h*wä'tō), a city of Mexico, capital of the state of the same name, 160 miles north-west of Mexico, is situated in a narrow defile, hemmed in by mountains, at the height of 6800 feet above the sea, with steep irregular streets, but well-built houses. Pop. 56,000.—The state is situated in the centre of Mexico; area, 11,411 sq. miles; population, 968,113. Its mines, once the richest in the world, still yield a large amount of gold and silver. The surface is traversed by the cordillera of Anahuac, 9711 feet in height.

Guanches (gu̧-ȧn'chez), the aborigines of the Canary Islands, long ago extinct as a separate nation, although Guanche blood probably flows in the veins of many of the present inhabitants. They possessed high moral and physical qualities. They practised the embalming of the dead. The few words of their language which remain seem cognate to the Berber tongue.

Guan'o (Peruvian *huaño*, dung), a valuable manure, consisting of the partially decomposed and dry excrement of fish-eating sea-birds, which has in some places accumulated in great masses. The name has been also extended to accumulations of a similar kind from land birds, and even from bats in caverns. Owing to the fact that rain washes such deposits away, great accumulations of guano exist principally in hot and dry tropical regions. The most important of all were the deposits on the Chincha Islands off the coast of Peru, which yielded a considerable revenue to the country, but are now quite exhausted. From 1853 to 1872 about 8,000,000 tons were got from these islands. The guano which was found there was from 60 to 80 or 100 ft. in thickness, and was entirely due to the droppings, accumulated for many ages, of the innumerable sea-birds which make these islands their resting-place and breeding-ground. Other deposits of less extent have from time to time been found, and Peru still remains the chief source of supply, its deposits being now, however, worked under the Chilian government. Guano varies extremely in composition, but it may be roughly divided into nitrogenous and phosphatic. The first of these contains about 21 per cent of ammonia. This is the case with the Peruvian variety, which contains almost all the inorganic matter required by a plant, and that in a highly available form, so that it is looked upon as one of the best of all fertilizing agents for different crops. Its use as a manure was known to the native Peruvians centuries ago, but no attention was paid to the accounts by modern travellers of its wonderful efficacy until A. von Humboldt brought some to Europe and had it analysed. It began to be brought to Europe about 1846. It is used raw or in its natural state, but most of the phosphatic guanos (some of which hardly deserve the name of guano) require to be dissolved by sulphuric acid before using. There are also manures known as *fish guano*, prepared from fish or fish refuse, *flesh guano, blood guano,* &c. Large quantities of fish guano are made in the U. States from the menhaden, the oil being first extracted.

Guanta, a new port of Venezuela, 12 m. from Barcelona, to which runs a railway.

Guapore (gwȧ-pō'rā), or ITENEZ, a river of South America, which rises in the Brazilian province of Matto Grosso, and after a varied course of about 500 miles, unites with the Mamore in forming the Madeira.

Guarana Bread (gwȧ-rä'nȧ), the seeds of the *Paullinia sorbilis*, order Sapindaceæ, a South American tree, pounded and made into cakes. It is extensively used in South America as a stimulant and restorative, and as a material for making a refreshing beverage. The active principle of guarana is said to be identical with theine or caffeine; and no known substance yields it so abundantly, the amount being 5·07 per cent, as against good black tea, which yields 2·13, and coffee about 1·00.

Guarantee', in law, an undertaking by which a person binds himself to answer for the failure of another. In England no person is liable on any special promise to answer for the debt, default, or miscarriage of another person, unless a written agreement, or some memorandum in writing for such purpose, shall be signed by the promiser or some other party lawfully authorized by him. It is a general rule that the surety shall not be bound beyond the express words of the engagement.

Guardafui (gwȧr-dȧ-fwē'), CAPE, or RAS JERDAFOON, the most eastern point of Africa, at the entrance of the Gulf of Aden, a frequent scene of shipwreck.

Guardian, in law, the custodier of persons incapable of directing themselves, and especially of infants, that is persons under 21 years of age. In England they may be said to be of five kinds: 1st, testamentary, or appointed by will; 2d, customary, by local usage; 3d, *ad litem*, or appointed by a court in order to conduct legal proceedings; 4th, by appointment of chancery; 5th, in tort, or by intrusion. Guardianship lasts in the case of the young until they have attained the age of twenty-one. An act passed in 1885 provides that, if the father dies without appointing a guardian, the mother becomes sole guardian, and even if a guardian has been appointed the mother is entitled to become a guardian conjointly.

Guardian Angel, the angelic guardian who, by some, is supposed to watch over every human being with a view of preserving him or her from moral evil. The notion is based on Gen. xlviii. 16, Matt. xviii. 10, and Heb. i. 14.

Guardians of the Poor, in England, persons elected to manage the affairs of the poor. The guardians have the management of the workhouse, and the maintenance, clothing, and relief of the poor. Under the provisions of the Parish Councils Act of 1894, the district councillors now act as guardians in rural parishes.

Guards, troops whose duty is to defend the person of a ruler. In modern times the term *guard* has been used to designate corps distinguished from the troops of the line by superior character, or only by rank and dress. Among the most famous guards were those of the rulers of France. The Scottish Guards of Charles VII. (see *Garde Écossaise*) and the Swiss Guards (see *Gardes Suisses*), enrolled by Louis XIV., have acquired historical importance. Under the latter monarch the Royal Guard amounted to 10,000 men. In 1789, when the revolution began, all the branches of the guards amounted to about 8000 men. The Imperial Guard was formed by Napoleon I. in 1804, and in 1812 it amounted to 56,000 men. His guards were almost completely annihilated at Waterloo. The Imperial Guard was revived by Napoleon III. in 1854, and took part in the Crimean war; but in the Franco-German war of 1870–71 its career was closed at the surrender of Metz. The guards of Frederick the Great of Prussia were of distinguished courage and remarkable height. The German guard now forms a complete army corps, and one of the finest bodies of troops in Europe. In England the guards, otherwise called the household troops, consist of the Life Guards (1st and 2d), the Royal Regiment of Horse Guards, and three regiments of foot guards, namely, the Grenadier Guards, the Coldstream Guards, and the Scots Fusilier Guards. The 1st and 2d Life Guards, and the Royal Horse Guards stand at the head of the cavalry of the country as the three regiments of foot guards do of the infantry. In time of peace they constitute the garrison of London and the guard of the sovereign at Windsor.

Guard-ship, a vessel of war appointed to superintend the marine affairs in a harbour, and to visit every night the ships of war which are not commissioned; she also acts as a depôt for seamen raised in the port until appropriated to other vessels.

Guarini (gwȧ-rē′nē), Giovanni Battista, Italian poet, was born at Ferrara, 1537, and died 1612. After having studied at Ferrara, Pisa, and Padua, and lectured in his native city on Aristotle, he entered the service of Duke Alphonso II. of Ferrara, who sent him on various important missions. Having lost the favour of the prince he retired into private life, but was recalled in 1585 to the office of secretary of state. Two years after he retired a second time. In 1597 he entered the service of Ferdinand I., grand-duke of Tuscany, which he soon quitted. His propensity to litigiousness necessitated his residence at Venice, Padua, and Rome. In 1605 he went as an ambassador of his native city to the court of Rome, to congratulate Paul V. on his elevation. He died at Venice. Guarini is one of the most elegant authors of Italy, as is especially shown in his Pastor Fido (Faithful Shepherd), a famous pastoral drama.

Guarneri (gwȧr-nā′rē), the name of an Italian family belonging to Cremona, distinguished for its skill in violin-making. The most celebrated of the family was Giuseppe, whose best instruments belong to the years 1690–1707.

Guastalla (gwȧs-tȧl′lȧ), a small town of N. Italy, near the Po, which, in the 16th century gave its name to the dominion of the Gonzagas, dukes of Mantua.

Guatemala (gwȧ-te-mä′lȧ), a republic of Central America; area estimated at 46,800 square miles; pop. (1893), 1,364,678. It is in general exceedingly picturesque, and distinguished by a luxuriant and varied vegetation. It is wholly mountainous or ele-

vated, the main chain of the Central American system traversing it south-east to north-west, and sending off numerous branches. Along the main chain are a considerable number of volcanoes, several of which are said to be active—as Fuego and Agua (14,890 feet high), which sends forth torrents of water. The state is well watered by numerous streams, none of much importance. There are several lakes, the most important being Dulce, through which a great part of the foreign trade of the state is carried on; Amatitlan, Atitlan, and Peten. On the table-land, of which a considerable portion of the state is formed, the climate is mild; but in more elevated situations the cold is intense. There is much valuable timber. The soil generally is of great fertility, producing according to altitude, soil, &c., maize, wheat, rice, coffee, cotton, tobacco, sugar, cochineal, cacao, indigo, vegetables, and tropical fruits in great variety. Fibre plants are numerous, including ramie, henequen, and others. The most important product is coffee, and the other chief exports are skins, caoutchouc, cochineal, wool, &c. The trade is chiefly carried on with Britain, the United States, Germany, and France. The exports in 1894 were about £3,500,000 in value (nine-tenths being coffee). In the *altos* or mountainous parts of the north-west considerable flocks of sheep are raised, the wool of which is manufactured into coarse fabrics. But the manufacturing industries are very insignificant, and trade is hindered by the want of roads and railways, the total length of the latter being only about 150 miles. Only about a third of the population are of European or mixed descent, the rest being Indians of the Aztec, Toltec or Maya races, mostly speaking their own native tongue. Numbers of the Indians are still quite uncivilized. Great attention is now being paid to education, the children, even Indians, in small and remote villages being compelled to attend school. The capital is Guatemala la Nueva (New Guatemala). The chief port is San José on the Pacific; Champerico on the Pacific, and Livingston in the Bay of Honduras are the other ports. The legislative power is vested in a national assembly elected for six years by universal suffrage. The executive is vested in a president, elected for four years. The revenue is about £1,600,000 annually; the public debt over £2,000,000.—NEW GUATEMALA, or SANTIAGO DE GUATEMALA, the capital, is situated about 5000 feet above the sea, and 80 miles distant from the Pacific. It is regularly built, has a fine cathedral, archbishop's palace, a university, &c., and manufactures of textiles, cigars, pottery, saddlery, embroidery, &c. Pop. 85,000.—OLD GUATEMALA, the former capital, is 10 miles south-west of New Guatemala. It was founded by the Spanish in 1542, and continued to be the capital till 1774, when it was destroyed by a volcanic outbreak. It has been rebuilt, however, and the population is now about 20,000.

Guava (gwä′va), the popular name for plants of the tropical genus *Psidium* of the nat. order Myrtaceæ. *P. Guaiava* (the guava tree) is a small tree, with square branches, egg-shaped leaves, and large white axillary flowers, which are succeeded by fleshy berries, which are either apple or pear shaped in the two principal varieties. The pulp is of an agreeable flavour, and of this fruit is made a delicious and well-known jelly. There is also a product called guava cheese.

Guaviare (gwä-vi-ä′rā), a river of S. America, Colombia, an affluent of the Orinoco; length, 900 miles.

Guayaquil (gwī-ä-kēl′), a city and seaport in Ecuador, on the Guayaquil, here about 2 miles wide, some 40 miles above its mouth in the Gulf of Guayaquil. Behind the town is an extensive marsh, which renders it unhealthy. There is also a deficiency of water, but the town is improving, and has already tramways and telephones. It is the chief port of Ecuador, and one of the best on the west coast of South America. Its principal exports are cacao (to the value sometimes of £1,000,000), coffee, and ivory-nuts. Pop. estimated at 40,000.

Guayra (gwī′rä), LA, a seaport in Venezuela, closely surrounded by mountains and precipices. It carries on a considerable trade, and exports coffee, cacao, &c. Pop. about 7500.

Gubbio (gub′i-ō; ancient *Iguvium*), a town in Italy, in the province of Umbria. It is a bishop's see, and has manufactures of silk and woollen stuffs. Here were discovered the Eugubine Tables (which see) in 1444. Pop. 5540.

Guben, a town in Prussia, province of Brandenburg. Brewing, dyeing, and tanning are carried on, and there are manufactures of woollen and linen cloth, tobacco, &c. Pop. 27,091.

Gudgeon (*Gobio*), a fresh-water fish, belonging to the carp family (Cyprinidæ). It has short dorsal and anal fins, without spines;

on each side of the mouth there is a small barbel; neither jaw is furnished with teeth, but, at the entrance of the throat, there are two triangular bones that perform the office of grinders. These fish are taken in gentle streams, and measure only about 6 inches.

Gudrun (gụd'rụn), a celebrated German popular epic belonging to the end of the 12th century, receiving its name from its heroine Gudrun, daughter of King Hettel of Hegelingen. Hettel is defeated by Hartmut, son of King Louis of Normandy, who carries Gudrun off, and on her steadfast refusal to marry him, has her subjected to various kinds of ill treatment, and in particular lets his mother keep her for years engaged in the lowest kinds of drudgery. At last she is released and revenged by her brother and her betrothed, king Herwig of Seeland. The poem also deals with the fortunes of Gudrun's father and mother, grandfather and grandmother, &c., and the scene is partly in North Germany, Denmark, Friesland, partly in Ireland and Normandy.

Guebres, GUEBERS (gē'bėrz), a name given to the fire-worshippers of Persia, represented in India by the Parsees. The original Guebres or followers of Zoroaster are now represented almost solely by those who inhabit the cities of Yezd and Kirman and the adjoining villages. At present they number only about 7000. As supreme deity they recognize Ahuramazda, or Ormuzd, the principle of light and source of all that is good; and his opposite and antagonist, the evil principle, the latter called Ahriman. They believe in the existence of heaven and hell, between which stretches the Bridge of the Gatherer or Judge; over this none but the righteous may pass. Among their leading practices may be mentioned their refusal to contract marriages with those of other creeds; their objection to eat beef or pork, or to partake of anything cooked by one of another religion, &c. They regard Ahuramazda as the source of light, and in their temples they feed the altars with perpetual fire, and hence their name fire-worshippers; but they do not revere it except as a symbol of the deity. When, in 651 A.D., Yezdegird, the last of the Sassanides, was defeated by the Caliph Omar, the majority of the Persians embraced Islamism. Those who continued Zoroastrians received the name of Guebres or infidels, and were subjected to persecutions so severe that the majority emigrated to India, where they became known as Parsees. See *Parsees*.

Guebwiller, the French form of *Gebweiler* (which see).

Guelderland. See *Gelderland*.

Guelder Rose, or GUELDRES ROSE, a name given to the cultivated variety of the *Viburnum Opulus*, or water elder, of the order Caprifoliaceæ. On account of the shape and colour of its flowers it is sometimes called the Snowball Tree. Its fruit is of a pretty red colour.

Guelfs, or GUELPHS, the name of a distinguished princely family which originated in Germany, but was also at one time connected with Italy, and which still flourishes in the two lines of the house of Brunswick, the royal (to which the reigning family in Britain belongs) and the ducal. The first who bore the name is said to have been Welf, the son of Isenbrand, whose grandfather was a vassal of Charlemagne. See *Brunswick* (Family of) and *Guelfs and Ghibellines*.

Guelfs (or GUELPHS) **and Ghibellines**, the names of two great Italian political parties in the 13th and 14th centuries. The names are derived from the Italian *Guelfi* and *Ghibellini*, which are corrupted from the German *Welfen* and *Waiblingen*. These latter words came to be used as party designations in Germany, in the war between Henry the Proud and Conrad of Hohenstaufen, to whom belonged the estate of Waiblingen in Würtemberg. About the year 1200 the designations Guelf and Ghibelline came to be employed to denote respectively the Italian patriotic and papal party, and the party which supported the domination of the German emperors in Italy. After the fall of the Hohenstaufen the Ghibellines became the partisans of aristocracy, and the Guelfs the partisans of democracy and liberty; but the designations ultimately denoted mere communal and family feuds, and Dante, originally a Guelf, but subsequently a Ghibelline, asserted that the two parties were the cause of all the miseries of Italy. The contest continued with bitterness for almost 300 years. Corresponding parties appeared in Italy under many different names, as the *bianchi* and *neri* (white and black) in Florence, &c.

Guelph, town of Canada, prov. Ontario, in a rich farming district, 45 miles W. of Toronto, with manufactures of woollens, sewing-machines, and agricultural implements, and a model farm kept up by the provincial government. Pop. 10,539.

Guercino (gwer-chē'nō). See *Barbieri*.

Guereza or GUERZA (ger'e-za, ger'za; *Colōbus guerza*), a species of monkey remarkable for its beauty, inhabiting the mountains of Abyssinia. Short, glossy, jet-black fur covers its limbs, back, and head, while a long fringe of silky white hair depends from the flanks. It frequents lofty trees.

Guericke (ger'ik-e), OTTO VON, German physicist, born at Magdeburg (of which he became burgomaster or mayor) 1602, died at Hamburg 1686. About 1650 he invented the air-pump, with which he made public experiments at the diet at Ratisbon, before the Emperor Ferdinand III. His most important observations, collected by himself, appeared at Amsterdam in folio (in 1672).

Guerin, JEAN BAPTISTE PAULIN, French painter, born at Toulon 1783, died at Paris 1855. He painted portraits and historical subjects; chief pictures—Cain after the Death of Abel, The Dead Christ, Adam and Eve driven out of Paradise, Anne of Austria and her Sons, &c.

Guernsey (gėrn'zi), the second largest and most western of the Channel Islands, lying off the north coast of France, 46 miles from Cherbourg, and about 68 miles from Start Point in Devonshire. It is of a triangular form, about 9 miles long, and 3 to 4 miles broad. The northern part is level, the southern more elevated, coast lofty and abrupt, the island being almost entirely of granite formation. The climate is extremely healthy; snow is rare, and frosts light and of short continuance. The soil is fertile. The breeding of cattle and the dairy are the principal objects of attention; and the butter made is highly esteemed. Horticulture and floriculture also receive much attention, and fruit, especially figs and grapes (the latter grown under glass), is very abundant. The grape-houses are further utilized for the raising of early vegetables and tomatoes, which are sent to the London market. The principal exports are cattle (the dairy cows being renowned), fruits, vegetables in the early spring; granite for paving, &c. The dialect of the island is the pure Norman of some centuries ago; but a knowledge of English is general. The principal place of education is Elizabeth College, at St. Peter's Port, the capital, and only town in the island. Steamers ply regularly between Guernsey and London, Southampton, Plymouth, and Weymouth. The island is under a lieutenant-governor, who represents the sovereign in the assembly of the states, a kind of local parliament. It is strongly fortified, and has a well-organized militia. Pop. 35,339. See *Channel Islands*.

Guernsey Lily, *Nerīnē Sarniensis*, a beautiful plant, with purple red flowers, native of S. Africa, family Amaryllidaceæ, so called from some of its bulbs being cast up in Guernsey from a wrecked ship and there taking root. There are several other species also called Guernsey lilies.

Guerrero (ger-rā'rō), a state of Mexico; area, 24,227 square miles. Its surface is finely diversified by mountain and valley, and partly covered by native forests; and it is rich in minerals, including gold, silver, copper, and iron. The principal port is Acapulco. Pop. 353,193, mostly Indians.

Guerrillas (ge-ril'az, in Spanish ge-ril'-yȧs), a name first given in Spain to light, irregular troops, consisting chiefly of peasants who fought against the invading French in the early part of the present century. The name has now become quite a general term for such irregular troops, and has travelled far beyond Spain.

Guesclin, BERTRAND DU. See *Du Guesclin*.

Gueux (geu; Fr. 'beggars'), a name given in derision to the allied nobles and other malcontents in the Netherlands, who resisted the despotism of Philip II., in 1566–67. The Count of Barlaimont having termed the malcontents *Gueux*, they adopted the name, and a suitable badge called the 'beggar's denier.' They were totally dispersed in 1567.

Guevara y Dueñas (gā-vä'rȧ ē dų-en'yȧs), LUIS VELEZ DE, a Spanish dramatic poet, born in 1570, died 1644. His literary fame rests chiefly on his Diablo Cojuelo (Lame Devil), which suggested the famous Diable Boiteux of Le Sage.

Guglielmi (gųl-yel'mē), PIETRO, Italian composer, born 1727, died 1804. He composed comic and heroic operas for the Italian theatre, visited Vienna, Madrid, and London, and afterwards returned to Naples, where he became the rival of Paesiello. In 1793 Pius VI. named him chapel-master of St. Peter's. He left more than 200 pieces, remarkable for their simple and beautiful airs, their rich harmony, and their spirit and originality.

Guiana (gī-an'a), BRITISH, a colony in the north of South America, about 560 miles long, and about 200 miles broad, having E. Dutch Guiana, W. Venezuela and Brazil, N. and N.E. the Atlantic, and S. Brazil; esti-

mated area, 109,000 sq. miles. It is divided into three settlements—Berbice, Demerara, and Essequibo. The coast tract forms a dreary belt, 10 to 40 miles broad, of mud-banks and shallows, and when drained the surface sinks 1 foot below the sea-level, hence strict attention must be paid to dams and sluices. This alluvial deposit is succeeded by a range of low hills not exceeding 200 feet in height. The interior is traversed in various directions by chains of hills or mountains. On the western boundary is the singular flat-topped and almost inaccessible mountain Roraima, rising to a height of 8600 feet. The other principal ranges are the Sierra Imataca, in the north part of the country; the Cannucu or Conocou, and the Sierra Acarai—the last occupying the extreme S.E. corner of the territory forming its boundary in this direction. They are densely wooded, but do not reach a greater elevation than 4000 feet. The geological composition of the mountains of British Guiana is various. Some of them consist of granite, gneiss, and trap rocks, and their different modifications; others are of sandstone; and others again appear to be of white quartz. Gold occurs in various places, and is now mined with success. Rock crystals and red agate are met with; and very white clay is found in the Essequibo. The extensive flats along the shore are composed of alluvial soil and clays, resting upon granite. The chief rivers are the Essequibo, Demerara, Berbice, and Corentyn. The climate, though moist and warm, is not on the whole unhealthy. Cultivation is confined to the coast region; the soil is very fertile, and much of it well adapted for the sugar-cane, the cultivation of which is mostly carried on by Indian and Chinese coolies. Guiana also produces coffee, tobacco, indigo, &c. Vegetation is singularly luxuriant, and the forest-trees are of the most magnificent description. Fruits, medicinal plants, fibrous vegetables, dyeing woods, &c., abound. The flora includes the *Victoria Regia*, the largest of the water-lilies. Among the animals are the jaguar, tapir, armadillo, sloth, vampire bat, alligator, &c., and many species of birds, such as humming-birds, parrots, &c. Snakes, some of them venomous, and troublesome insects are numerous. Guiana has two dry and two wet seasons, each continuing for three months: December, January, February, June, July, and August, constitute the wet season, the other months of the year the dry. The mean annual temperature is nearly 81° 2′. Violent thunderstorms occur at the change of the seasons; but the hurricanes, so destructive in the West Indies, are unknown. In the dry seasons the climate is agreeable, and in the interior, more healthy than in many parts of the West Indies. The trade is concentrated mainly in Georgetown, the capital.



Indians of Guiana.

Sugar, rum, and molasses are the principal exports. The exports have recently varied in value from about £1,800,000 to £3,000,000. The government consists of a governor, a council, a 'court of policy'; also a 'combined court', consisting of the court of policy and 6 elected financial representatives. Guiana was first settled by the Dutch about 1580. It was taken by the British in 1783, 1796, and again in 1803, and latterly it was definitively given up to them. Pop. (1891), 280,869, of whom a great proportion are of African race or coolies from India.

Guiana, Dutch, or Surinam, a Dutch colony in South America, situated between English and French Guiana; area, about 60,000 sq. miles. The general aspect is the same with that of British Guiana—flat and swampy on the coast, and mountainous in the interior; well watered by numerous streams, and of which the Surinam and its affluents are the chief. It has also a similarly warm, moist climate, and is very fertile. Only a small part of the colony is under cultivation. On the Surinam river, about 10 miles from its mouth, is situated the capital, Paramaribo. The principal exports are sugar, coffee, molasses, and rum. The gov-

ernment is vested in a governor-general and council. Pop. 72,533.

Guiana, FRENCH, a French colony in South America, between Dutch Guiana and Brazil; area, about 35,000 sq. miles. This territory resembles British Guiana in its physical features, climate, and vegetable productions, with the addition, in the latter case, of pepper, cloves, cinnamon, nutmeg, &c. The colony comprises the island of Cayenne, celebrated for the pepper bearing that name. Gold has also been found in considerable quantities. The French are said to have first settled in Cayenne in 1604. Pop. 25,157.

Guiana Bark, the bark of *Portlandia hexandra*, order Cinchonaceæ, considered to possess great value as a febrifuge.

Guicciardini (gwē-chàr-dē'nē), FRANCESCO, Italian historian, born at Florence 1482, died 1540. He became professor of jurisprudence at Florence, and held various public appointments. He began in 1534 his famous History of Italy—Dell' Istoria d'Italia—which embraces the period 1490–1534. It has been translated into English.

Guicowar's (gī-ko-wàr') **Dominion.** See *Baroda*.

Guides, in an army, persons selected for their acquaintance with the topography of the place in which the army operates, and employed to conduct the army or detachments of it to any place which has to be reached. The name of 'guides' is sometimes given to troops without any very specific meaning. In the Indian army it is given to a regiment of cavalry and infantry attached to the Punjab Frontier Force.

Guido Aretino (gwē'dō à-re-tē'no), or GUIDO D' AREZZO, an Italian monk, celebrated for his skill in music, flourished in the 11th century. He was a native of Arezzo, became a Benedictine monk, and finally prior of Avellana, where he died, 1050. He invented the musical staff of lines and spaces (or at least systematized their use), and he introduced the names of the first six notes of the scale, *ut, re, mi, fa, sol, le.*

Guidon (gī'don), the little flag or standard of a troop of cavalry.

Guido Reni (gwē'dō rā'nē), a celebrated Italian painter, born at Bologna in 1575, died there 1642. Being the son of a musician he devoted some time to the study of music, but, as painting seemed his true vocation, he was placed under the tuition of Dionysius Calvaert, and subsequently joined, in his twentieth year, the school of the Caracci. In 1602 he visited Rome, and having seen the paintings of Caravaggio, he imitated his style. At the request of Cardinal Borghese he painted The Crucifixion of St. Peter and the Aurora. He was also employed by Paul V. to paint a chapel on Monte Cavallo, and one in Santa Maria-Maggiore. Guido's paintings are generally considered as belonging to three different periods. His earliest pictures, after the style of Caravaggio and Caracci, display powerful contrasts of light and shade. His second manner exhibits light and agreeable colouring, with little shade. His third period is marked by careless haste. Having quarrelled with Cardinal Spinola, the treasurer of Urban VIII., he left Rome and returned to Bologna, but was subsequently recalled. In 1622 he removed to Naples, but, after a brief stay, returned once more to Bologna, never to leave it again. Among his most famous works may be mentioned his Aurora, his Magdalene, Michael Vanquishing Satan, Lot and his Daughters, his Fortune, &c. Guido was also celebrated in his own day for his etchings, but his works of this class have now sunk very much in value.

Guienne, or GUYENNE (gē-en'), an ancient province of France, now comprising the departments of Gironde, Lot, Lot-et-Garonne, Dordogne, and Aveyron, with part of Landes and of Tarn-et-Garonne. The capital was Bordeaux. It fell into the hands of the English in 1152, was nearly all conquered by Charles V. in 1377, reconquered by Henry V. and Henry VI., and finally annexed to France 1453.

Guignet's Green (gē-nyā), a pigment prepared by heating in a reverberatory furnace a mixture of three parts of boracic acid and one of bichromate of potassium, made into a thick paste with water. This colour is quite fixed—it does not alter by light or reagents, and it is quite harmless, so that it forms an excellent substitute for the greens which contain arsenic and copper.

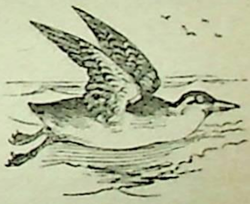
Guild, a society or association for carrying on commerce, a handicraft, or some other undertaking. Such associations are known from very early times in various countries. The societies of tradesmen exclusively authorized to practise their art, and governed by laws of their own, played a very important part in the middle ages. They often formed a bulwark against the oppression of the nobility, and were thus extremely conducive to the growth of municipal and civil liberty. Traces of these trade societies are

found in the 10th century. In Milan we find the mechanics united under the name *credentia*. At Florence the trades were federated into twenty-one guilds or *arti*. These originated in 1282, on the overthrow of the nobility, and every candidate for citizenship was obliged to enter some particular guild. Such a step became a necessity at a period in which individual rights, as such, failed to secure respect. The purely Teutonic guilds, although connected with the constitution of the cities, possessed certain peculiarities. In the 13th century the German guilds of craftsmen obtained the right of defending by arms their own interests, and became so powerful that persons unconnected with a trade were often glad to attach themselves to them. As illustrations of the manner in which associations originally instituted for defensive purposes became the mainstay of a tyrannical monopoly may be mentioned, the frequent withholding of permission from more than a certain number of master mechanics to reside in one place, the restrictions placed upon particular branches of industry, and upon the free exercise, by each individual, of his trade except under the sanction of the guilds. With the view of destroying the political influence which they had acquired the Emperor Frederick II. abolished them by a decree issued in 1240; but the decree remained without effect, as did also the clauses inserted with a similar view into the Golden Bull in 1356, and it was not until the present century that unrestricted freedom to practise any trade was established in the German states. In Austria this was done in 1860, and in 1868 it was done for all the states of the North German Confederation. In Britain trade guilds long possessed an importance which was mainly political. As the right of voting was involved in the membership of a guild, many persons, not mechanics, acquired the rights of 'freemen' by connecting themselves with some body of this kind. These guilds, in England, had no legal right to prevent any man from exercising what trade he pleased. The only restriction on the exercise of trades was the statute of Elizabeth, requiring seven years' apprenticeship. This the courts held to extend to such trades only as were in being at the time of the passing of that statute; but by an act passed in 1835, every kind of restriction on artisans, trades, &c., was abolished. The guilds or companies of the city of London (among the oldest of which are the weavers, founded in 1164; the parish clerks, in 1232; the saddlers, in 1280; the fishmongers, in 1284) are still very important corporations, which give relief to poor and decayed members, and also manage vast funds bequeathed for benevolent purposes. Besides the secular guilds there were from a very early period, in Britain, religious guilds. From the time of Henry II. all such guilds were required to have a charter from the crown. In 1388 a return of these guilds was ordered to be made, and it was then found that that of Corpus Christi, York, numbered 14,800 members. The property of the religious guilds was sequestrated in the reign of Henry VIII. In France guild-privileges were sold by the state from the 10th century till the revolution of 1789, but at that date guilds were entirely abolished. This was done also at a later period in Belgium, Holland, Italy, Sweden, and Denmark. Many of the trades-unions have now somewhat of the character of the ancient guilds.

Guildford, a town of England, the county town of Surrey, on the Wey, a well-built and thriving place. It has an iron-foundry, corn, paper, and powder mills, and an important grain market. It ceased to be a parliamentary burgh in 1885. Pop. 14,319.

Guildhall, the city hall of London, Cheapside, first built in 1411, all but consumed in the great fire of 1666; and in 1669 rebuilt. The front was not erected until 1789. The most remarkable room is the hall, 153 feet long, 48 broad, and 55 high, used for city feasts, &c. It contains the curious wooden statues of Gog and Magog. In the common-council room is a collection of pictures, some of them valuable. There is also a library in the Guildhall.

Guillemot (gil'e-mot), a name of several web-footed birds belonging to the family Alcidæ or auks. The guillemots have a straight, compressed, and pointed bill, covered with feathers as far as the nostrils, and have no hallux or hind-toe. The wings are pointed and very short, the legs also short, and placed far back. They live on fish, and build on precipitous rocks adjoining the

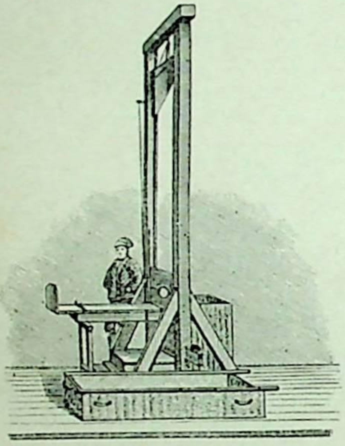


Common Guillemot (*Uria troile*).

sea. The common guillemot (*Uria troile*), about 18 inches in length, is frequently found in Britain, and lays one egg; the black guillemot (*U. grylle*), is smaller, and lays two or three eggs; the *U. lacteolus*, is entirely white.

Guilloche (gil-losh'), in Grecian architecture, an ornament consisting of straight or curved bands symmetrically interplaited.

Guillotine (gil-lo-tēn'), an engine for beheading persons at one stroke—an invention of the middle ages—adopted with improvements by the National Assembly of France during the first revolution on the



Guillotine as used in Paris.

proposal of a Dr. *Guillotin*, after whom it is named. In this apparatus decapitation is effected by means of a steel blade loaded with a mass of lead, and sliding between two upright posts, grooved on their inner sides, the person's neck being confined in a circular opening between two planks, the upper one of which also slides up or down. The condemned is strapped to a board, which in the cut is shown resting horizontally on the table in front of the upright posts, but which is easily drawn forward and set upright when necessary, and again canted over upon the table and rapidly moved up so as to place the neck of the condemned within the semicircle of the lower plank, the other being raised for the purpose. On the right of the table is a large basket or trough of wicker-work for the reception of the body. Under the place where the head rests is an oblong trough for its reception. The knife is fixed to the cap or lintel on the top of the posts by a claw in the form of an 8, the lower part of which opens as the upper part closes. This claw is acted upon by a lever to which a cord is attached. When the head of the condemned is in position the cord is pulled, and by the action of the lever the knife is set at liberty, descending by the grooves in the upright posts and falling upon the neck of the condemned just behind the planks which keep the head in position. The scaffold, which is surrounded by an open railing, is raised 6 or 7 feet from the ground. The same name is given to a machine which cuts by a knife descending between grooved posts, much used for cutting paper, straw, &c.

Guimaraens, or GUIMARÆS (gē-mä-räns'), a town in Portugal, province of Minho, strongly fortified and well built. Pop. 8205.

Guinea (gin'ē), a geographical division of Western Africa, including the Atlantic coast-line and an indefinite area of the interior between the frontiers of Senegambia and Cape Negro, or Cape Frio (where German territory now begins). It is divided into two districts, lying north and south of Cape Lopez: the former, called North or Upper Guinea, includes Sierra Leone, Liberia, the Grain, Ivory, Gold, and Slave coasts, the states Ashantee, Dahomey, Benin, &c.; the latter, called South or Lower Guinea, includes Congo, Angola, and Benguela. See the separate articles.

Guinea, an English gold coin worth 21*s.* sterling. Guineas were first coined, in the reign of Charles II. (1663), of gold from Guinea, and bore the figure of an elephant. Its value ranged at different times from 20*s.* up to 30*s.*, until, in 1717, it was fixed at 21*s.* In 1817 the coin was withdrawn from circulation. It is, however, still customary to estimate professional honoraria, &c. in guineas.

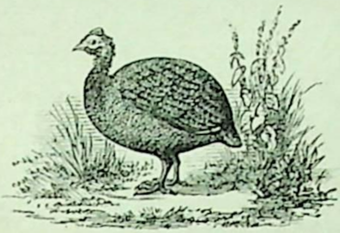
Guinea, GULF OF, that portion of the Atlantic which washes the shores of Upper Guinea, between Cape Palmas and Cape Lopez, and including the bights of Benin and Biafra. The islands of Fernando Po, Prince's, and St. Thomas, are within this gulf.

Guinea, NEW. See *New Guinea*.

Guinea-corn, a name given to durra, one of the grains also called millet. In the U. States it is cultivated under the name of broom-corn.

Guinea-fowl, or PINTADO, a genus of gallinaceous birds, family Phasianidæ or pheasants, originally all natives of Africa. The

common guinea-fowl (*Numĭda meleagris*), now well known as a domestic fowl, has a slate-coloured plumage varied with round white spots. It is about the size of a common fowl, and is of a noisy and quarrelsome



Guinea-fowl (*Numĭda meleagris*).

disposition. Its eggs are esteemed. Among the other species of guinea-fowl may be mentioned the *Numĭda vulturīna* (or *Acryllium vulturīnum*), by far the most beautiful, with somewhat vulturine head and neck; the *Numĭda mitrāta*, found in Kaffraria and in Madagascar; and the *Numĭda cristāta*, a native of the Cape of Good Hope.

Guinea-grass (*Panĭcum maximum*), a very tall species of grass, a native of Africa, of the same genus with the millet, often 6, and sometimes even 10 feet in height. It has been naturalized in South America and the West Indies, and largely cultivated for fodder. It does not perish even in Britain, but there it is not so productive as in warmer climates.

Guinea Pepper (*Xylopia aromatica*), a lofty tree of the same family with the custard apple. Its fruit, consisting of dry carpels, is used as pepper, 'Negro Pepper.' The term Guinea Pepper is often used as an equivalent for *Grains of Paradise*, or Malaguetta. It is also a common designation of *Capsicum frutescens*. See *Capsicum*.

Guinea-pig, a well-known rodent mammal, family Cavidæ or Cavies. The domestic specimen is sometimes regarded as descended from *Cavia aperea*, and sometimes termed *Cavia cobaya*. It is a native of South America (like the other cavies), and resembles the pig only in its grunting voice. It is a timid little animal, extremely prolific, and it feeds on vegetables, especially parsley, bread, grain, &c. It is very destitute of intelligence.

Guinea-plum, the fruit of a West African tree, *Parinarium excelsum*, order Chrysobalanaceæ, growing to the height of 60 ft.

Guinea-worm (*Filaria Medinensis*), a parasitic worm of the order Nematoda, white, of the thickness of pack-thread, somewhat attenuated at the hook-shaped posterior extremity. It varies in length from 6 inches to several feet, and it is found in the intertropical regions of the Old World. It is frequently found in the tissue of the human body below the skin, and produces a painful ulcer, out of which a small portion of the worm issues to eject its eggs. It is then carefully extracted by winding it round a stick once or twice every day, care being exercised not to break the worm. The manner in which it effects an entrance into the body is unknown.

Guingamp (gaṇ-gāṇ), a town in France, dep. Côtes-du-Nord, on the Trieux; has manufactures of linen, thread, &c., and several tanneries. Pop. 8744.

Guipuzcoa (gē-puth'ko-ȧ), one of the three Basque provinces, in the N.E. of Spain, bounded N. by the Bay of Biscay; N.E. by France; area, 728 sq. miles. The coast is bold and rocky, and much indented; the interior is generally mountainous. The chief riches of the province are in its minerals, particularly iron, and its woods, which are used in smelting it. San Sebastian is the capital. Pop. 178,878.

Guisborough (giz'bu-rō), a town in England, in the county of York (North Riding), situated in a narrow but fertile valley, extending along the Tees. Cast-steel founding is carried on. Pop. 5623.

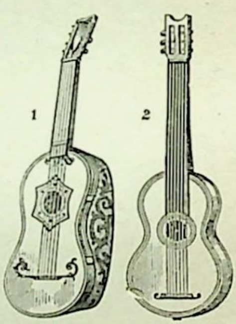
Guiscard (gis-kär), ROBERT (that is, *Robert the Cunning*), Duke of Apulia and Calabria, a son of Tancred de Hauteville, born in 1015. His brothers, having acquired large possessions in Italy, Robert followed them about 1053, and in the same year captured Pope Leo IX. at Civitella. On the death of his brother Humphrey he was proclaimed count of Apulia in 1057. He then conquered Calabria, and Pope Nicholas II. made him gonfalonier of the Church. Having become a tributary of the holy see, and suppressed the privileges of the Apulian nobility, he sent his youngest brother, Roger, to seize Sicily. Robert himself arrived in Sicily in 1061, and, in conjunction with his brother, defeated the Saracens at Enna. Returning to Italy, Robert conquered the towns still remaining in the hands of the Saracens, being detained from 1068 to 1071 at the siege of Bari. In 1074 he was excommunicated by Gregory VII. for refusing to become his vassal, but the ban was removed in 1080. As his

daughter Helen was betrothed to the son of the Byzantine emperor, Michael VII., Guiscard, on the latter's deposition, took up arms in his favour, and defeated Alexis Comnenus at Durazzo (1082). As Gregory VII. had been meanwhile imprisoned by the invading forces of Henry IV. of Germany, Guiscard delivered the pontiff in 1084. He then went again to Epirus, where he repeatedly defeated the Greeks, and, by means of his fleet, made himself master of many of the islands of the Archipelago. He was upon the point of advancing against Constantinople, when he died in the island of Cephalonia in 1085.

Guise (gwēz), a town of France, dep. of Aisne, beautifully situated on the left bank of the Oise. It has manufactures of textiles, iron and copper foundries, &c., and a large work for making stoves, connected with which is an edifice in which live some 400 families of the working people. It is an ancient city, and its castle gave its title to the distinguished family of that name (see the following article). Pop. 7677.

Guise (gwēz), a distinguished ducal family of France, a branch of the house of Lorraine. The founder was Claude, a son of René II., duke of Lorraine, who in 1506 became naturalized in France. In his favour the county of Guise was erected in 1528 by Francis I. into a duchy. He died in 1550, leaving behind him five daughters (the eldest of whom, Marie, married James V. of Scotland, and was the mother of Mary, queen of Scots) and six sons—François, who succeeded him, Charles (Cardinal of Lorraine), Louis (Cardinal of Guise), Claude, François, and René. The family acquired great political importance on the accession of Francis II., who was married to Mary, queen of Scots. The direct line became extinct in 1675. In 1704 the title was revived for the house of Condé.—Two of the dukes require particular mention.—FRANÇOIS DE LORRAINE, the second duke, born in 1519, early distinguished himself in war, especially at Metz, which he defended with success against Charles V., and at the battle of Renti, 1544. In his Italian expedition (1556-57) he failed to conquer the kingdom of Naples. But he was successful in that which resulted in the final annexation of Calais to France. Under Henry II. and Francis II. he was the virtual ruler of France. On the death of Francis II. the factions of Condé and Guise arose, the Protestants (Huguenots) being on the side of the former, the Catholics on that of the latter. When civil war broke out the Duke of Guise took Rouen and Bourges, and won the battle of Dreux in 1562. He was preparing for the siege of Orleans, the central point of the Protestant party, when he was assassinated by a Huguenot nobleman, Feb. 1563. He left memoirs written by himself.—HENRY, third duke, eldest son of the preceding, was born in 1550. He was a bitter opponent of the Huguenots, and fought against them at Jarnac and Moncontour, and advised the massacre of St. Bartholomew (1572). From revenge he personally conducted the assassins to the house of Coligny. In 1576 was formed the Catholic League, first projected by his uncle, the Cardinal of Lorraine. A period of civil war followed, the party of Guise proved too strong for his opponents, and having brought about a rising of the Catholics in Paris (May 1588), he entered the city in triumph. He might now have made himself master of the throne, but negotiations were set on foot, and the duke's displays of imprudent ambition led to his assassination in the king's cabinet, Dec. 23, 1588, at Blois, whither the states had been summoned in order finally to ratify the treaty that had been arranged.

Guitar (gi-tär'), a stringed instrument with a hollow body, and a neck somewhat similar to that of a violin, used especially to accompany the voice. The modern or Spanish guitar has six strings, the three highest of gut, the three lowest of silk covered with fine wire, tuned respectively to the E in the second space of the bass staff, A its fourth, and the treble D, C, B, and E. The intermediate intervals are produced by bringing the strings, by the pressure of the fingers of the left hand, into contact with the frets fixed on the key-board, while those of the right pluck or twitch the strings. It is extremely popular in Spain. The Spaniards derived it from the Moors, who brought it from the East.



1, French Guitar of 17th Century. 2, Modern Guitar.

Guizot (gē-zō), François-Pierre-Guillaume, French historian and statesman, born at Nîmes, 1787, died 1874. His father, a lawyer, having in 1794 perished by the guillotine, his mother and her three sons retired to Geneva, where François was gratuitously educated at the gymnasium. In 1805 he commenced legal studies at Paris, but gradually drifted into the literary profession. In 1812 he married Mdlle. de Meulan, editor of the Publiciste, and became professor of history at the Sorbonne. On the fall of the empire he obtained several public offices, such as councillor of state, and director-general of the departmental and communal administration. In 1816 he published Du Gouvernement Représentatif et de l'État actuel de la France, and Essai sur l'Instruction Publique. In 1820 the Duc de Berry was assassinated, and Guizot's party fell before an ultra-royalist reaction. In 1825 he was deprived of his chair on account of the political character of his lectures, but it was restored to him in 1828. In 1829 he again became councillor of state, and in 1830 was elected deputy for the arrondissement of Lisieux. After the July revolution he was appointed minister of the interior, but resigned in 1831. After the death of Périer, Guizot, along with Thiers and De Broglie, formed a coalition ministry, and he rendered great service as minister of public instruction. He became ambassador at the British court in 1840, and next year he became the real head of the government of which Soult was the nominal chief. He retained the office of minister of foreign affairs until 1848, and during that period opposed all measures of reform. After the fall of Louis Philippe, Guizot escaped and fled to England. Henceforth he practically retired from public life. Born of a Calvinist family, Guizot always remained a stern Protestant of the orthodox type, although he zealously supported the temporal authority of the pope. Among his numerous works may be mentioned, Histoire de la Civilisation en France, Histoire générale de la Civilisation en Europe; Histoire de la Revolution d'Angleterre; Washington; Discours sur la Révolution d'Angleterre; Méditations et Études Morales; Guillaume le Conquérant; Mémoires pour servir à l'Histoire de mon Temps (1858–68); Méditations sur l'État Actuel de la Réligion Chrétienne; Mélanges Biographiques et Littéraire; Histoire de France Racontée à mes Petits Enfants; &c.

Gujerat, Gujarát, or Guzerat, a maritime province in Western Hindustan, Presidency of Bombay; total area, 70,000 sq. miles; pop. 11,000,000. The south-west portion is an extensive peninsula, with the Gulf of Kach (Cutch) on the north-west side, and the Gulf of Cambay on the south-east. The central districts form an extensive plain, but the northern and eastern districts are mountainous, rugged, and jungly. The rivers include the Narbada, Myhe, and Sabarnati. The climate is very hot in summer, and during the hot months the surface mostly appears sand or dust, and in the rainy season a thick mire; but it is extremely fertile. Gujerat comprises a number of native states within its area, the chief being the scattered territories of the Gaekwar or Guicowar of Baroda. The population presents an extraordinary assemblage of sects and castes. It gives name to the vernacular language of Northern Bombay—Gujaráti. The area of the British portion, comprising the districts of Surat, Broach, Kaira, Panch Mahals, and Ahmedabad is 10,158 sq. miles, and the pop. 3,098,197.

Gujranwála, a town of India, in the Punjab, administrative headquarters of district of same name. It has inconsiderable manufactures of country wares, such as brass vessels, &c. Pop. 26,785.—Area of district, 3017 sq. miles. Pop. 690,169.

Gujrát, a district of India in the lieutenant-governorship of the Punjab, in the Rawál Pindi division between the Jehlam and the Chenab. Pop. 760,875.—Gujrát, the capital, 5 miles from the Chenab, is a commercial centre. Its manufactures are principally of cotton and of Gujrát ware, that is inlaid work in gold and iron. Pop. 18,743.

Gulbar'ga, a town of India, in the state of Hyderabad. Pop. 28,200.

Gulden, a silver coin of Austria-Hungary and also of Holland, worth about 1*s.* 8*d.* sterling. Also called a *florin*.

Guledgarh (*Guledgud*), a town of India in the Kaládji district, Bombay Presidency. Pop. 15,500.

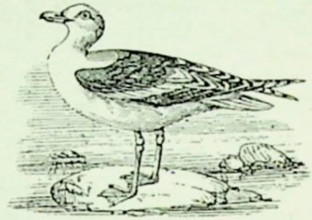
Gules (gölz), the heraldic name of the colour red. It ranks after the metals *or* and *argent*, and has the highest place among colours.

Gulf Stream, one of the most celebrated of the oceanic currents, so called because it issues from the Gulf of Mexico. It owes its origin to the fact that the westward-

moving waters of the tropical portion of the Atlantic, encountering the eastward projection of South America, become divided into two currents, one setting southwards along the Brazilian coast, and the other northward past the mouths of the Amazon and Orinoco, into the Caribbean Sea. It then enters the Gulf of Mexico, and thence emerges through the Channel of Florida as the Gulf Stream. Its course is next to the north and eastwards, in a direction parallel to the coast of the United States, past Cape Hatteras (lat. 35° 13′), along the southern edge of the 'great banks' of Nantucket and Newfoundland (between the meridians of 48° and 60° west), after which its course as a distinct current cannot be traced. In the earlier part of its course, especially when rounding the extremity of Florida, the Gulf Stream forms a well-defined current, distinguished by its high temperature and its deep blue or indigo colour. On account of the descent of the Polar or Baffin Bay current along the coast in a direction opposite to that of the Gulf Stream, the water on its inland side is colder than that to the eastward of it. The difference of temperature between the Gulf Stream and this cold current sometimes amounts to 20° (or even 30°) Fahr. The velocity of the Gulf Stream varies with its course. Within the Florida Channel it attains a mean of 65 miles per day, this sinks to 56 miles off Charleston, becomes 36 miles to 46 off Nantucket, and 28 miles to the south of the Newfoundland Banks; 300 miles to the eastward of Newfoundland its movement is hardly perceptible. At the bottom of the Florida Channel the observed temperature is 34°, that of the surface from 80° to 84°. Geographers have greatly exaggerated the influence of the Gulf Stream on the temperature of Europe. If it possesses any *direct* influence such must be extremely small, as the current is both too narrow and too shallow, and its slight amount of superior heat probably vanishes after it has passed Cape Hatteras. The relatively high temperature of western and north-western Europe must rather be referred to the general set of the tropical waters to the north-east, and to the warm winds blowing in the same direction, and not to the Gulf Stream exclusively.

Gulf-weed (*Sargassum*), a genus of seaweeds (Algæ) sub-order Fucaceæ, of which one species, *S. Baccifĕrum*, grows on tropical coasts, and accumulates in great floating beds, but does not propagate when detached. It derives its ordinary appellation from the exploded idea that it is borne on the Gulf Stream from the Gulf of Mexico. Several areas of the ocean exhibit great quantities of this and other weeds floating on the surface. One such, the Sargasso Sea, is in the North Atlantic, lying south-west of the Azores, and north of the tropic of Cancer.

Gull, the general name of a family of birds distinguished by their straight bill, bending downwards towards the point, and marked below the under mandible by a triangular prominence, by their large wings, slender legs, palmated feet, and small hind toe. Generally seen in large flocks, the larger



Lesser Black-backed Gull (*Larus fuscus*).

species frequent the sea, the smaller, lakes or rivers. They swim well, but are incapable of diving. Their flight is rapid and long sustained. They are extremely voracious, and feed on every kind of animal food, putrid or fresh. Their principal food is fish, which they catch with great agility, darting down like an arrow. They breed only once a year, laying two to four eggs. The species are exceedingly numerous, and resemble each other greatly. Among the principal are the common gull (*Larus canus*), which breeds on the coast, or inland in moory districts; the lesser black-backed gull, *L. fuscus;* the black-headed gull, *L. ridibundus*, of which the masked gull, *L. capistrātus*, is only a variety; the ivory gull, *L. eburneus;* the Iceland gull, *L. islandicus*, distinguished by its white quill feathers from the herring gull, *L. argentātus;* the great black-backed gull; the burgomaster; the little gull; sabine's gull; the kittiwake, &c.

Gullet. See *Œsophagus*.

Gum, a substance of various properties which exudes spontaneously from the bark of certain trees, such as the plum, the peach, &c.; or from incisions made in the bark to facilitate the flow. Gums form non-crystalline rounded drops or tears, the purest varieties being transparent or translucent, of a pale

yellow but sometimes of a dark colour. When dissolved in water gum forms a thick, smooth fluid, with considerable viscosity. Some gums, such as gum-arabic, dissolve in water; others, like tragacanth, are only partially soluble; they are insoluble in alcohol. By being insoluble in alcohol gums are distinguished from resins. They have no odour, and only a very faint taste. The different kinds of gum receive their names from the countries from which they are imported—such as gum-arabic, gum-senegal, Barbary gum, East India gum, &c., and from individual features, as cherry-tree gum, tragacanth, &c. *Gum-resins* require water and alcohol to dissolve them. See *Gum-resins.*

Gumal. See *Gomul.*

Gum-arabic is the purest form of gum, and may be regarded as typical. It comes from various species of Acacia, such as the *Acacia vera*, *A. seyal*, and *A. arabica* or *nilotica* (see *Acacia*). The gum exudes spontaneously, and its appearance is an indication of the tree being in an unhealthy condition; but in order to get it in sufficient quantity incisions are made in the bark. Gum-arabic is very largely employed in the finishing and dressing of fabrics; for thickening the colours in calico-printing; in pharmacy; as a cement; in ink-making; for making crayons and water-colour cakes, and for many other purposes. The purest gum-arabic is in round tears, transparent, and almost colourless, faintly odorous, completely soluble in water, the solution being feebly acid.

Gumbin'nen, a Prussian town, prov. East Prussia, on the Pissa. It has brewing and distilling, manufactures of woollen and linen cloth. Pop. 10,453.

Gum-boil, an abscess in the gum, generally the result of toothache or of the presence of decayed teeth or stumps. The carious tooth or stump, if the inflammation proceeds from this cause, should be removed. The purulent matter should be evacuated by a free incision, and the mouth frequently washed with tincture of myrrh and water.

Gum-cistus (*Cistus ladaniferus*), a plant largely cultivated in Portugal, and yielding a gum of a pleasant balsamic odour.

Gum-dragon. See *Tragacanth.*

Gum-elastic, caoutchouc or india-rubber.

Gum-elemi. See *Elemi.*

Gum-juniper, the resin of *Callitris quadrivalvis*, a coniferous tree of Barbary, used in varnish, &c.

Gumming, a disease of certain fruit-trees, as cherries, plums, apricots, peaches, &c., consisting in a morbid exudation of gum, and generally resulting in the death of the tree.

Gum-resins, solidified juices obtained from plants. They contain a gum, which is soluble in water, and a resin, which dissolves in spirit, so that the body usually is nearly quite soluble in dilute alcohol; but there are usually present in addition essential oil, and a variety of impurities. The gum-resins have frequently a strong and characteristic taste and smell. They are solid, opaque, and brittle. The common gum-resins are aloes, ammoniacum, asafœtida, bdellium, galbanum, gamboge, myrrh, olibanum, opoponax, sagapenum, and scammony.

Gumti, or GOOMTI, a river of Hindustan, rises in the North-west Provinces, and flowing south-east falls into the Ganges between Ghazipur and Benares. In its course it passes the cities of Lucknow and Jaunpur. Length about 500 miles.

Gum-trees, a general name for trees of the genus *Eucalyptus* (which see).

Gun, a missile weapon, causing destruction by the discharge of a ball, bullet, or other substance, through a cylindrical tube, along which it is propelled by the action of gunpowder or other explosive substance. The term includes small arms, such as portable sporting and military weapons; machine-guns, which discharge a rapid succession of bullets through one or more barrels on a rest; and the heavier pieces termed cannon or ordnance. See *Cannon*, *Rifle*, *Machine-gun*, &c.

Gun-boat, a term applied to small war-vessels mounting often only a single heavy gun, and employed in coast defence or in attacking large and heavy-armoured vessels. Some gun-boats have their one gun on the deck mounted so as to be turned in any direction by means of a pivot. In others the single gun is placed on a platform, which can be raised to the deck or lowered to the hold. The gun in this case does not turn on a pivot, the manœuvring being effected entirely by the turning of the vessel. Some of the gun-boats of the present day are armed with several powerful breech-loading guns besides quick-firing and machine guns; and they may also be fitted for discharging torpedoes. Many of them are very swift.

Gun-carriage, the structure on which a cannon is mounted, and on which it is fired. Gun-carriages are of very various con-

structions. In the case of a field or siege piece the carriage is united, for travelling, with a two-wheeled fore-part, termed a *limber*, to which the horses are attached, so as to form a single four-wheeled carriage. In action the gun is unlimbered, and then rests on its pair of wheels, and on a strong support termed the *trail*. A gun in a fortress has its carriage commonly mounted on what is termed a *traversing platform*, that is, a strong framework supported on metal trucks or small wheels. These trucks are constructed to run on metal rails, which are laid in concentric arcs of circles, whose centres are a real or imaginary pivot close to the mouth of the embrasure through which the gun fires. By this means the muzzle of the gun, when run up, is brought nearly over the pivot, so that the direction of its fire may be altered laterally considerably, and yet allow of a very narrow embrasure. Carriages on the 'disappearing principle,' which are visible to the enemy only during the acts of aiming and firing (while the loading is effected under shelter), are best exemplified in those of Col. Moncrieff. In one of these the carriage is so contrived that a heavy counterweight attached to it is sufficient to raise the gun into the position for firing, the sides of the carriage having some resemblance to the 'rockers' of a rocking-horse. The recoil brings the gun down into the loading position, after which it is again brought into firing position as before. The iron carriages now made are thus elaborate mechanical structures. In mortars a cast-iron bed takes the place of a carriage.

Gun-cotton, or PYROXYLINE, is an explosive substance formed by the action of nitric acid on cotton. In the process of manufacture sulphuric acid is mixed with the nitric, its function being to absorb the water formed by the weakening of the nitric acid as it gradually combines with the cotton. The product of this process is a chemical compound of four or five times the explosive power of gunpowder. The cotton is generally reduced to a finely divided condition, and the gun-cotton moulded into disks of suitable sizes. When ignited in a free state it burns with a strong flame; it is only when fired by a detonating fuse or when heated in confinement that it explodes. The presence of water and other substances does not interfere with this kind of explosion. From this follows the important fact that it can be kept wet with safety while in a condition in which it may be exploded by means of a detonator. *In short, when wet it is quite safe, and yet quite ready for work at a moment's notice;* for, while it refuses to burn even in the heat of a powerful flame, the application of a large or of a small detonator inserted in one dry disk of gun-cotton causes the wet mass to explode with its full violence. Bursters of gun-cotton and water have been used in shells for certain purposes. When exploded it produces little smoke and a very small amount of residual matter. There are also preparations allied to gun-cotton with wood-fibre as a basis, such as Schulze's Powder, sawdust powder, &c. An imperfect chemical form of gun-cotton termed collodion, soluble in a mixture of ether and alcohol, is used in photography.

Gundamuk'. See *Gandamak*.

Gunduck. See *Gandak*.

Gun Factories, ROYAL, the British government establishments at Woolwich, in which are forged the great guns for the army and navy. The workshops were first built in 1855–56, and cast-iron guns were originally their first product.

Gunja. Same as *Hashish*.

Gunnel, or BUTTERFISH (*Centronōtus gunellus*), a fish which belongs to the family of the Blennies. The common gunnel resembles an eel, is about 6 inches in length, is brown in colour, and has black spots on the base of the dorsal fin. It is termed 'butterfish' on account of the mucous secretion of its skin.

Gunner, in the navy, is a warrant-officer appointed to take charge of the ammunition and ordnance of a war-vessel, and to have a general supervision of the weapons. A *chief gunner* is a commissioned officer. In the army a gunner is simply an artilleryman, or one who has to work and attend to the guns.

Gun'nera, a genus of plants of the bread-fruit order, one species of which (*G. scabra*), a native of S. America, somewhat resembles the rhubarb, and is used as an ornamental plant. It has large rough leaves, astringent roots, while its leaf-stalks are a substitute for rhubarb.

Gunnery, the science of conducting the fire of artillery. Gunnery may be divided into the theoretical and practical branches. The former consists chiefly in the application of mathematics to the solution of the problems in dynamics involved in the consideration of the motion of shot through the air, and is essential to the design of good systems of rifling and well-proportioned pro-

jjectiles. Practical gunnery, which deals with the actual firing, has reference rather to the use of individual guns than to the handling of artillery on a large scale. Theoretical gunnery would be simple were the projectiles fired in vacuo, as gravity alone would, in such a case, require to be taken into account, and the path of projectiles would simply describe a parabola. The line taken by a projectile (or its *trajectory* as it is called) is, however, subject to modifications caused by the resistance of the air, the form of the shot, &c. Among things to be considered in gunnery are the *velocity* of the projectile, initial and subsequent, the *angle of elevation* of the piece, the *range* or distance to which the projectile is carried, &c. With cast-iron spherical shot the chief complication arises from the centre of gravity never falling exactly in the centre of the figure. Rifled guns, however, fire projectiles with a *certain known rotation*, and in the case of elongated shot, these are more accurately centred in the bore by the action of the grooves, and possess the faculty of travelling point first, and of thus overcoming the resistance of the air. One mechanical disadvantage belongs to rifled shot, namely, the wild irregularity of their ricochet, a disadvantage which, however, does not apply to shells burst on the instant of graze by percussion fuzes, or before contact by time fuzes. All the British service projectiles have their centres of gravity nearly half way along their axes, and in flight they carry towards the right hand of the person laying the gun, a species of deviation to which the name of *drift* or *deflexion* is given. In determining the velocity of projectiles various instruments are used. Among these are Wheatstone's electro-magnetic chronoscope, the Bashforth chronograph, the Noble chronoscope, &c. In ordinary artillery fire the charge is a fixed one, and the elevation is varied according to the range. Horizontal fire against the front of a column or line of works is termed *direct fire;* that which sweeps along a line of men or earth-works, *enfilade fire; vertical fire* is when the piece is fired at a high angle of elevation.

Gunny-bags are bags made of a coarse cloth or sacking manufactured in India of some native fibre, chiefly jute. They are extensively used in India in packing rice, sago, spices, &c., for export, and in America for bales of cotton.

Gunpowder is a mixture of saltpetre, sulphur, and charcoal. We hear of gunpowder from a very early period. It appears to have been used in China at, if not before, the Christian era. Marcus Græcus, who lived about the 9th century, describes its composition, which was also known to Roger Bacon, who refers to it in 1267. It was also apparently known to the Arabs at an early period. In 1342 the Moors employed it in the siege of Algesiras. According to the common story the discovery of its propulsive power was due to the German monk Barthold Schwartz between 1290 and 1320. Guns are said to have been employed by Edward III. in 1327, on his invasion of Scotland. It is also asserted that gunpowder was employed in 1346 by the English at Crécy. It was not, however, until the 16th century that its use in warfare became general. The proportion of the ingredients in the composition of gunpowder is different in different countries. In Britain the proportions for different kinds, such as sporting and mining powders, differ slightly. The gunpowder of the mills at Waltham Abbey contains 75 saltpetre, 15 charcoal, and 10 sulphur. The crude saltpetre is dissolved in an equal weight of boiling water in a copper boiler, filtered, and allowed to cool and crystallize in a trough in order to purify it from nitrates of soda and lime, chlorides of potassium and sodium, &c., the liquid being continually agitated, so that the crystals may be formed small and pure. They are then washed and allowed to drain. The sulphur is purified and ground. The charcoal is obtained from alder or willow wood, or from dogwood for the finest powder. These ingredients are first roughly mixed, then sprinkled with water and incorporated under rollers in a mill, and formed into a cake termed 'mill cake.' This is broken up under grooved rollers, and brought by pressure into 'press cake.' After this it is granulated, by being passed between toothed rollers, and separated into classes by sieves of different sizes of mesh. Latterly a very large grain has been adopted for the heaviest charges; this is termed pellet or pebble powder. 'Pellet' powder is made by filling the cylindrical holes in a thick gun-metal plate with mealed powder, and by means of pistons under a hydraulic press, forming them into short cylinders or 'pellets,' with a small cavity at one end to catch a flame the more readily. 'Pebble' powder is made by cutting or pressing edges which divide the press cake into small cubes; these, like pebbles, have their

corners rubbed off and rounded by friction. The largest pebble powder consists of cubes of 1½ inches. There is also a gunpowder known as 'prismatic', the grains forming large hexagonal prisms with a hole through the centre. 'Cocoa' powders are made with other kinds of carbon than wood charcoal. Smokeless powder has been introduced ('cordite' may here be named), but has not yet been properly tested in war. Gun-cotton is the base or an important ingredient of all the well-known smokeless powders. As it is necessary that the flame must traverse the interstices between the grains of powder, the grains must be suited to the size of the charge of the gun. The greatest precautions must be taken to prevent fire or water from coming into contact with gunpowder. Hence it is usually kept in magazines which are of great strength in defensive works, although lighter and well-ventilated buildings suffice under other conditions. In the transportation of gunpowder, the casks should be dust-proof, and the carriages and vessels containing it should be water-tight. As iron vessels are dangerous, gunpowder is usually packed in copper-hooped barrels made with copper nails. The explosive power of gunpowder is very great. It is, however, necessary to place it within a confined space, as, when it is heaped up in the open air, it explodes without report or much effect. As the result of experiments it appears that the weight of the gases produced by inflaming gunpowder is about $\frac{6}{10}$ths of that of the powder, and their volume 288 times its bulk, when they have attained an elasticity equal to that of the air. If the effect of heat evolved during the combustion be added, the elastic force is increased to 1000 atmospheres in round numbers, *i.e.* a pressure of about 6½ tons to the sq. inch.

Gunpowder Plot, a conspiracy formed in England in 1604, the second year of the reign of James I., by some Roman Catholics, to blow up the king and parliament in order to be revenged on the government for its severities against their religion. The time ultimately fixed for the execution of the plot was the 5th of November, 1605, when parliament was to be opened by the king in person. The plot originated with Robert Catesby, Thomas Winter, and John Wright, and was at once made known to Guido Fawkes, a zealous Catholic, who had served in the Spanish army in Flanders, and to Thomas Percy, a relation of the Earl of Northumberland. These five were the original conspirators, but the plot was subsequently communicated to Sir Everard Digby, Ambrose Rookwood, Francis Tresham, Thomas Keyes, Christopher Wright (a brother of John), and to some Jesuit fathers and others. The conspirators took a house next the Parliament House, and their original plan was by digging under this house to undermine the House of Parliament. They latterly discovered, however, that there was a cellar right under the chamber of parliament, which was occupied by a coal-dealer. They at once hired this cellar, and filled it with powder, faggots, and billets. The plot was discovered by means of a letter sent Lord Mounteagle, a Catholic peer in favour with the court, who laid it before the secretary of state, Cecil. It was a warning couched in mysterious terms, not to be present at the approaching meeting of parliament. Cecil showed it to some of the council, and did nothing till the return of the king from a hunting party. On hearing the letter James at once divined its meaning, and declared that it referred to gunpowder. This led to investigation and to the arrest of Fawkes in the cellar, where a hogshead and thirty-six barrels of powder were discovered. It is now very generally thought that Tresham, the reputed author of the letter to Lord Mounteagle, had previously informed his lordship of the plot, and that the sending and publication of the letter were merely intended as blinds. It seems also that Cecil, knowing the king's vanity, was desirous of making him the discoverer of the plot. Catesby, Percy, and the two Wrights were killed in defending Holbeach House, in which they had taken refuge, against the sheriff. Sir Everard Digby was tried and executed at Northampton, Tresham died in prison. Fawkes, Rookwood, Winter, and others were tried at Westminster on 27th Jan. 1606, and executed on the 30th and 31st.

Gun-room, a compartment in a ship of war, partly occupied by the junior officers.

Güns (gůnz), a town, Hungary, 57 miles S.E. of Vienna. It consists of a walled town of limited extent, and a large suburb; staple manufacture woollen cloth. Pop. 7301.

Gunter, EDMUND, an English mathematician, who flourished in the reign of James I., and invented the instruments mentioned in following arts., as also the sector, &c. He was born in 1581, and died in 1626. He was educated at Oxford, and became professor of astronomy in Gresham College,

London, in 1619. He was the first to employ the terms *co*sine, *co*tangent, &c.

Gunter's Chain, the chain in common use for measuring land; so called from its inventor, Edmund Gunter. Its length is 66 feet, or 22 yards, or 4 poles of 5½ yards each; and it is divided into 100 links of 7·92 inches each. 100,000 square links make 1 acre.

Gunter's Scale, a scale having various lines upon it, of great use in working problems in navigation. This scale is usually 2 feet long and about 1½ inches broad. On the one side are the natural lines, and on the other the artificial or logarithmic ones.

Guntur, a town of Hindustan, presidency of Madras, district of Kistna, 46 miles from Masulipatam, and 30 miles from the Coromandel coast. Pop. 23,359.

Gunwale, or GUNNEL, the upper edge of the side of a ship or boat.

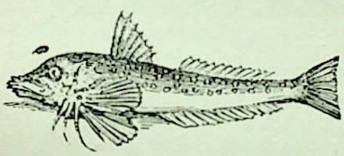
Gurhwal, GURWAL. See *Garwhal*.

Gurjun, a thin balsam or oil, derived from trees of the genus *Dipterocarpus*, in Burmah and the Eastern Archipelago. It is used for mixing paints, preserving wood from the attacks of white ants, and also medicinally.

Gurkhas. See *Goorkhas*.

Gurmuktes'war, a town of British India, in the Meerut district, North-western Provinces, on the Ganges, which is here crossed by a much-frequented ferry. A great annual fair attracts 200,000 pilgrims from all parts of the country. Pop. 6000.

Gur'nard, or GURNET, the popular name of acanthopterous fishes of the genus *Trigla*. The head is angular and wholly covered with bony plates. The body is elongated, nearly round and tapering; there are two dorsal fins; the pectoral fins are large; the teeth are small and numerous. The gray gurnard is the *Trigla gurnardus*, common on the British coast; the red gurnard is the *T. cucŭlus*, also common on the same coasts; the flying gurnard is the *T. volitans*, which



Gray Gurnard (*Trigla gurnardus*).

inhabits the Mediterranean, Atlantic, and Indian seas.

Gusta'vus I., commonly called *Gustavus Vasa*, was born in 1490, or, according to others, in 1496. He was the son of Eric Johansson, a Swedish noble, served under Svante Sture, the administrator of the kingdom, was treacherously carried off with other noble Swedes by the king of Denmark, and kept a prisoner in Jutland for more than a year, but at length escaped, reached, after many dangers, Dalecarlia, where he roused the peasants to resist Danish oppression, defeated the Danes, took Upsala and other towns, and in 1523 was elected king. In 1529 he procured the abolition of the Roman Catholic religion in Sweden, and established Protestantism. He died in 1560. During his long reign Sweden made great progress in commerce and civilization.

Gustavus II., GUSTAVUS ADOLPHUS, King of Sweden, a grandson of Gustavus Vasa,



Gustavus Adolphus, King of Sweden.

was born in 1594, and received a most careful education. He was trained to war under experienced generals, took his place in the state councils at the age of sixteen, and was in command of the army in his seventeenth year during the war with Denmark, which was concluded in 1613, and by which Sweden recovered important possessions on the Baltic. He then turned his arms against the Russians, drove them from Ingria, Karelia, and a part of Livonia, which were secured to him by the peace of Stolbova in 1617. He was then engaged in a war with Poland, which lasted nine years, and was concluded on advantageous terms for Gustavus in Sept. 1629, he being allowed to retain important conquests in East Prussia.

His attention was now diverted from northern wars by the affairs of Germany. The oppression of the Protestants by Ferdinand II. excited his sympathy, and the progress of Wallenstein alarmed him. Probably also he was moved by the ambition of foreign conquests. He embarked for Germany in 1630 with about 20,000 men, landed near the mouth of the Oder, and in a short time had seized nearly all Pomerania. After taking many fortified towns, repeatedly defeating the imperial generals, at Leipzig (1631), Würzburg (1631), Passage of the Lech (1632), and conquering a great part of Germany, he was killed in the battle of Lützen, against Wallenstein, 16th November, 1632. (See *Thirty Years' War.*) Though a severe disciplinarian, he was beloved by his soldiers, and the prestige of success derived from his victories lasted long after his death.

Gustavus III., King of Sweden, born in 1746, succeeded his father, Adolphus Frederick, in 1771. Finding the country weary of the misrule of the nobles, he gained the good-will of the army, surrounded the assembly of the states-general, and forced them to accept a new constitution which much restricted their privileges. In 1788 he took command of the army against Russia and Denmark, and stormed the defences of Frederickshall, destroying a great number of vessels. In 1789 he executed another *coup d'état*, arresting the opposition leaders, and passing a law extending the royal prerogative. On the outbreak of the French revolution he made strenuous exertions to form a coalition between Russia, Denmark, Sweden, and Spain, but while preparations were making a conspiracy of the nobles was formed against him, and he was shot at a masquerade by Ankarstroem, a disbanded officer, on 16th March, 1792. He died on 29th March.

Gustavus IV. (Adolphus), King of Sweden, was born on 1st November, 1778, and succeeded his father, 29th March, 1792. On assuming power Gustavus showed that he had inherited his father's hatred of the principles of the French revolution, which he carried to the extent of fanaticism. After the Peace of Tilsit he exposed himself to a war with Russia while he was at war with France, by refusing to join the continental blockade and opening his ports to England; and in 1808 he quarrelled with England, his only ally. Finland was lost to Sweden, and in 1809 a revolution took place. Gustavus was dethroned, and his uncle, the Duke of Sudermania, proclaimed king under the title of Charles XIII. Gustavus died in poverty at St. Gall, 7th February, 1837.

Güstrow (gụs'trō), a town of Germany, in Mecklenburg-Schwerin, on the Nebel. It is well built, has a cathedral, a fine old castle, and an ancient and beautiful palace, once the seat of the Dukes of Mecklenburg-Güstrow. Pop. 13,117.

Gut. See *Cat-gut* and *Silkworm-gut.*

Gutenberg, Johan, the reputed inventor of printing with movable types, was born at Mayence or Mainz, about the end of the 14th century. Little or nothing is known of his early life. In 1434 he is said to have been living in Strasburg, and in 1436 to have started or attempted to start a printing office there; but this seems false. In 1448 we find him at Mainz, where he formed, two years after, a copartnership with Johann Fust, and established mainly with the money of the latter, a press, in which the Mazarin Bible, the Letters of Indulgence, and the Appeal against the Turks were printed. After five years this connection was dissolved, and Fust sued Gutenberg for large advances which he could not pay, and by a judgment at law obtained possession of most of the printing materials, with which, in company with his son-in-law Schöffer, he continued to print books. After this, according to some, Gutenberg carried on a separate printing establishment; but this is doubtful, and there is no book or printed matter which can certainly be ascribed to Gutenberg after the date 1454. Gutenberg seems to have died at Mainz in 1468.

Guthrie, Thomas, a Scottish divine, born at Brechin, Forfarshire, in 1803. He was educated at the University of Edinburgh, and was licensed as a preacher in connection with the Church of Scotland in 1825. He did not at once exert himself to procure a church, but assisted his father in the business of his banking office, and also spent a winter (1826–27) in Paris studying medicine. In 1830 he was presented to the parish of Arbirlot, and he accepted a call to Greyfriars, Edinburgh, in 1837, where he soon became very popular with all classes. In 1843 the Disruption took place, and Guthrie took an active part along with Chalmers and Candlish in organizing the Free Church. He himself became minister of Free St. John's, Edinburgh. The work with which his name is chiefly identified out of Scotland, was the

introduction into Edinburgh of the ragged school system, then recently originated in London and Aberdeen. Into this work he threw himself with characteristic energy, employing in it both his personal labours and his pen. His Plea for Ragged Schools (1847) remains one of the most celebrated of his productions. In 1849 he received the degree of D.D. from the University of Edinburgh. In 1864 Dr. Guthrie was compelled in consequence of disease of the heart to resign the pastorship of St. John's. The remaining years of his life were spent in active promotion of philanthropic objects. He became editor of the Sunday Magazine in 1864, but never assumed full editorial responsibility. He died 24th Feb. 1873. His chief works are, The Gospel in Ezekiel, (1855), A Plea for Drunkards (1856), Christ and the Inheritance of the Saints (1858), &c. An Autobiography and Memoir has been published by his sons.

Gutta-percha (pér'cha; Malay name, meaning 'gum-tree'), a substance resembling caoutchouc in many of its properties, but stronger, more soluble, and less elastic. It is the inspissated milky juice of *Isonandra Gutta* and other kindred trees of the nat. order Sapotaceæ. It chiefly comes from Malacca, Borneo, and other islands of the Indian Archipelago. When pure, gutta-percha is of a brownish-red colour. Below the temperature of 50° it is as hard as wood and excessively tough. By an increase of heat it becomes more flexible, until at a temperature of 115° F. it becomes pasty, and between this and 140° or 150° it may be moulded into all varieties of forms with the greatest ease, retaining precisely the same form as it cools and hardens to its previous state of rigidity. It is insoluble in water, soluble with difficulty in ether and other caoutchouc solvents, but very readily in oil of turpentine and naphtha. It is not attacked by solutions of alkalies nor by hydrofluoric acid, but it is acted on by sulphuric, nitric, and hydrochloric acids. Gutta-percha has been applied to a variety of purposes: as a substitute for leather, especially in the soles of shoes, &c., as an insulating coating for the copper wires of submarine telegraph cables, as an ingredient in mastics and cements, for the manufacture of flexible hose-tubes, bottles, &c.



Sprig of Gutta-percha Tree (*Isonandra Gutta*).

Guttif'eræ, a natural order of exogenous trees or shrubs, which generally secrete an acrid yellow resinous juice, in some cases of considerable value, as the gamboge yielded by the *Garcinia morella*, or the tacamahaca from the *Popŭlus balsamifĕra*. They are found in the humid and hot places of tropical regions, chiefly South America. The fruit of some is highly esteemed, in particular the mangosteen and the mammee apple.

Gut'tural (from Latin *guttur*, the throat), a sound produced chiefly by the back parts of the cavity of the mouth, as the German and the Scotch *ch*. The letters *k* and *g* in English may be classed as gutturals.

Gutzkow (gụts'kō), KARL FERDINAND, German writer, born at Berlin in 1811. After studying theology he took to journalism and politics, and became the leading spirit of a small body of reformers known as 'Young Germany.' In 1835 his novel Wally die Zweiflerin appeared. It was at once confiscated by the government as hostile to religion and society, and the author was imprisoned for three months. In spite of government prohibition Gutzkow managed to publish a number of works from Hamburg, where he had settled. Amongst these are: Blasedow und seine Söhne (1838), a satire, and Börne's Leben (1840). He was active, also, in dramatic literature, his tragedies Richard Savage (1840), Patkul (1841), and Uriel Acosta (1847), and his comedies Zopf und Schwert (1844), and Das Urbild des Tartufe (1847), having been very popular. In 1842 he left Hamburg, and after a visit to Paris, described in Briefe aus Paris, settled at Frankfort till 1847, when he became director of the Dresden theatre. Here he devoted himself to novel-writing, producing the romances Die Ritter vom Geist (1850), Der Zauberer von Rom (1858), and Hohenschwangau (1868). He died in 1878.

Gützlaff (gụ̈ts'läf), KARL, D.D., a German missionary, born in 1803. He went out as a missionary to the Battas in Sumatra in August 1826, but settled instead in Batavia, Singapore, and Siam. In 1831 he went to China, acted as British interpreter during the first Chinese war, visited Europe in

1849, and died at Victoria, Hong-Kong, in 1851. His principal works are: Journal of Three Voyages along the Coast of China in 1831, 1832, and 1833 (London, 1834); China Opened, or a Display of the Topography, History, &c., of the Chinese Empire (1838); Geschichte des Chinesischen Reichs (Stuttgart, 1847).

Guy (gī), Thomas, the founder of Guy's Hospital, London, was the son of a lighterman in Southwark, and born in 1643. He was brought up a bookseller. He dealt largely in the importation of Bibles from Holland, and afterwards contracted with Oxford for those printed at that university; but his principal gains arose from dealings in South Sea stock in 1720. He amassed a fortune of nearly half a million sterling, of which he spent upwards of £200,000 in building and endowing his hospital in Southwark, besides erecting almshouses at Tamworth and supporting various other charities. He was member of parliament for Tamworth from 1694 to 1707. He died in 1724. See *Guy's Hospital*.

Guyenne. See *Guienne.*

Guy of Warwick, an old English metrical romance, whose hero is an Anglo-Danish knight said to have been the son of Siward, baron of Wallingford, to have become Earl of Warwick, and to have slain in single combat the Danish giant Colbrand, the Dun-Cow of Dunsmore, and the dragon of Northumberland, and many other wonderful feats. He is said ultimately to have become a hermit in Warwick.

Guyon (gē-yōn), Jeanne-Marie Bouvier de la Motte, Madame, a celebrated mystic, the introducer in France of the system of Quietism, was born at Montargis 13th April, 1648. At the age of sixteen she was married to Jacques Guyon, after whose death in 1676 the tendency to mystic enthusiasm which had characterized her younger years, again acquired ascendency, and she began the religious propagandism of her extreme views of self-abnegation, indifference to life and death, and even to future salvation or perdition. She became associated with some enthusiastic priests, abandoned her children and her goods, reserving a moderate annuity; and moved from place to place, making numerous proselytes. She also published numerous works, such as Le Cantique des Cantiques interprété selon le Sens Mystique (1685); Poésies Spirituelles (five vols. 1685); Discours Chrétiens et Spirituels (1716), &c. At last the Archbishop of Paris thought it necessary to take steps against the spread of Madame Guyon's mystical doctrines. Through his influence she was shut up in the convent of the Visitation, but afterwards released at the instigation of Madame Maintenon, who herself became for a time a convert to the new doctrines, and allowed Madame Guyon to preach in the seminary of St. Cyr, where she made a convert and disciple of Fénelon. A commission of ecclesiastics, chief amongst whom was Bossuet, now sat in judgment, and the doctrines of Madame Guyon were condemned (1695). This led to her being imprisoned for some years, latterly in the Bastille, whence she was liberated in 1702. The rest of her life was spent in retirement and in works of charity. She died 9th June, 1717.

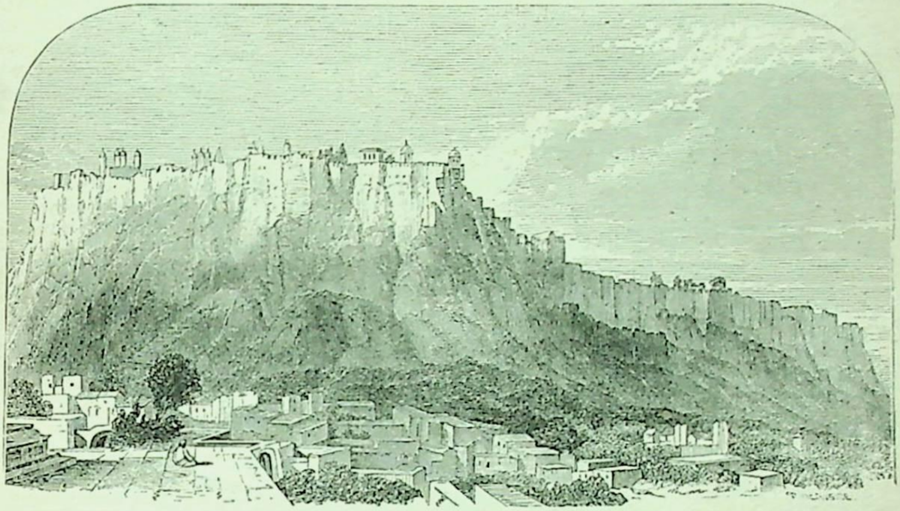
Guyot (gē-yo), Arnold, geographer and physicist, born in Switzerland in 1807, died in the U. States in 1884. He studied theology at Berlin, then took up natural science, and became professor of history and physical geography in the Academy of Neufchâtel. He shared in Agassiz's investigations of glacier phenomena of the Alps. In 1848 he emigrated to the U. States and delivered lectures in Boston, which afterwards appeared under the title Earth and Man. He rendered much service to meteorological science in connection with the Smithsonian Institution, and travelled extensively in the U. States. In 1855 he was appointed professor of geology and physical geography in the College of New Jersey, Princeton.

Guy's Hospital, a London hospital, founded in 1723 by Thomas Guy (see *Guy, Thomas*). The original building, completed in 1725 and endowed at a cost of over £200,000, contained accommodation for 400 sick or incurable persons. It has since been greatly improved and enlarged, and in consequence of a bequest in 1829 of £190,000 from William Hunt, one of the governors, a new building, containing accommodation for 300 additional patients, has been added, and the hospital is now the largest in London, the beds amounting to 720. Attached to the hospital is an extensive medical school, containing lecture-rooms, theatres, museums, and medical library. There are usually about 350 students at the hospital.

Guzerat. See *Gujerat.*

Gwal'ior, a city and fortress of Hindustan, capital of the state of Gwalior, situated 65 miles south from Agra. The fortress is the largest, the strongest, and the most magnificent in India. It stands on an isolated

rock about 350 ft. high and nearly perpendicular in the upper part. The fortress contains wells and reservoirs of water, and is inaccessible except by steps up the side of the rock. Old Gwalior, the town at the northern angle of the base of the rock, is built of stone, and has some remarkable ruins of temples and an interesting example of old Hindu palace architecture. Pop. about 25,000. The new town, known as New Gwalior or Lashkar (the camp), the residence of the ruler, Maharajah Sindhia, has sprung up recently on the south-eastern skirt of the rock, but is already a flourishing city with a population of 104,083, of whom about 80,000 are Hindus.—The State of Gwalior, in political relationship with the government of India, consists of several portions of territory, otherwise known as Sindhia's Dominions, the largest and most compact portion, usually known as Gwalior, being the one containing the above town



The Fortress of Gwalior.—From an original sketch.

and fortress. The total area of Gwalior is 29,067 sq. miles. Gwalior is not as a whole very fertile; one of its most notable products is opium. The drainage is chiefly taken by the Chambal. Pop. 3,525,233.

Gwyn'iad, GWINIAD (W. from *gwyn*, white). The *Coregŏnus Pennantii*, a fish of the salmon or trout kind found plentifully in some of the Welsh lakes, in Ulleswater, and in many lakes in Europe. It is gregarious, and may be taken in great numbers at a draught.

Gwynn, ELEANOR, better known by the name of *Nell*, a celebrated mistress of King Charles II., was at first an orange girl, and also gained her bread by singing from tavern to tavern. About 1667 she became the mistress of Lord Buckhurst, who surrendered her about 1670 to the king. As mistress of the king she had an establishment, and was made lady of the privy chamber to Queen Catharine. She was merry and open-hearted, is said to have been faithful to Charles, mindful of old friends, and a liberal patroness of the poets Dryden, Lee, Otway, and Butler. From her are sprung the dukes of St. Albans. She died, according to some accounts, in 1687, according to others in 1691.

Gyges (gī'jēz), a king of Lydia who reigned, according to Herodotus, B.C. 716-678. He was the favourite of the Lydian king Candaules, who, to convince him of the beauty of his queen, showed her to him naked. The queen was so incensed that she ordered Gyges either to murder the king, ascend his vacant throne, and become her husband, or to atone for his curiosity by death. He chose the former.

Gymna'sium (jim-), the name given by the Greeks to the public building where the young men, quite without clothes (hence the name, from *gymnos*, naked), exercised themselves in leaping, running, throwing the discus and spear, wrestling, and pugilism.

Its objects, however, were extended also to the exercise of the mind; for here philosophers, rhetoricians, and teachers of other branches of knowledge delivered their lectures. Gymnasia were at first only open level places, surrounded by a wall, and partitioned off for the different games. Latterly they were composed of a number of connected buildings, spacious enough to admit many thousands. See *Gymnastics*.

Gymnasium, a term applied in Germany to a class of schools corresponding pretty nearly to the grammar-schools and great public schools of Britain (such as Eton, Harrow, &c.). Formerly in the gymnasia Latin and Greek, and the branches connected with antiquity, were taught almost to the exclusion of other subjects; but a more practical bent is given to the course of instruction in these institutions now, though the *real-schools*, as they are called, are the institutions specially established for high-class education in such branches as mathematics and physical science, history and modern languages. The gymnasia are the feeders of the universities, and the training adopted in them is specially intended to equip the pupils for entering these institutions. The last or exit-examination, to show whether the pupils are fit to enter the university, is very severe, and includes history, Latin and Greek, and at least one foreign language.

Gymnastics (for derivation, see *Gymnasium*) is the technical term used to designate any system of exercises specially designed to promote the development of physical, and especially of muscular powers. An excellent gymnastic training is given by cricket, football, rowing, and similar amusements, but the special value of formal gymnastic exercises is that they are capable of being scientifically arranged so as to secure not only a general development of muscular power, but also an accurate knowledge of the uses of the various muscles, and further that they are capable of being applied to each individual case, so as to meet, allow for, and as far as possible overcome defects in physical organization. For these purposes an elementary course of gymnastics is of great value to all, especially to the sedentary student. In regard to gymnastic exercises two general rules may be laid down, which will form an efficient guide in self-imposed exercises. The first is the universal rule in mechanics that the strength of any machine is the strength of its weakest part; the second is the fundamental law of muscular exercise, that it is exercise within the extreme power of the muscle which develops and improves, while straining weakens and injures, and excessive exercise develops particular muscles abnormally at the expense of the general health. It is quite possible, indeed, to carry physical exercises as a whole too far, and to develop muscular power at the expense of vital strength. Till the age of twelve the ordinary games and pastimes of childhood are generally quite sufficient exercise; after that some very light system of gymnastics may be adopted to aid the development of the system. After the age of thirty-five unusual muscular efforts are apt to leave persistent strains, and moderate exercise becomes the safest means of developing and giving tone to the muscular system.

Gymnogen (jim'no-gen), in bot. a plant with a naked seed. Among the gymnogens are pines and firs, yews, joint-firs, the cycads, &c. In the gymnogens there is no proper ovary, the seeds being fertilized by the pollen coming into direct contact with the foramen of the ovule without the intervention of a stigma.

Gymnosperm (jim'-), a plant with a naked seed; a gymnogen (which see).

Gymno'tus (jim-). See *Electrical Fishes*.

Gympie, a municipal town of Australia, in Queensland, on the side of a range of hills overlooking the river Mary, 116 miles north of Brisbane. It owes its origin to the gold-fields here which have yielded good results. The town has some good public buildings, well-paved streets, and is lighted by gas. Pop. 8449.

Gynæceum (ji-nē'sē-um), in bot. the pistil taken in a collective sense, precisely as the stamens form the andrœceum, the petals the corolla, and the sepals the calyx.

Gynan'dria (jin-), name given to one of the classes in the artificial system of Linnæus, characterized by having the stamens and pistil consolidated in a single body, as in orchids.

Gyne'rium (jin-), a genus of grasses, of which the best known is *G. argenteum* or Pampas Grass (which see).

Gyöngyös (dyeun'dyeush), a town, Hungary, 44 miles N.E. of Budapest; it has manufactures of woollen stuffs, an active trade, and produces the celebrated Erlauer red wine. Pop. 16,061.

Gypaëtus (ji-pā'ē-tus), the genus of birds to which belongs the Bearded Vulture or Lämmergeyer of the Alps (which see).

Gypsies (from *Egyptians*, the name by which they were called in the English statutes), a wandering nation, whose physical characteristics, language, and customs differ much from those of European nations. They are called by the French *Bohémiens*, from the belief that they were Hussites driven from Bohemia; in Germany the general name is *Zigeuner*, which is not unlike the Italian *Zingari*. They call themselves *Rommany*, from *rom* (man). This race is slowly melting away. Its present total number hardly reaches 500,000; of whom there are about 120,000 in European Turkey; 140,000 in Hungary; 60,000 in Transylvania; 40,000 in Spain; 40,000 spread over Germany, France, and Italy; 18,000 in Britain, of whom, however, only a small number are tent-gypsies, preserving the language and traditions of their race; and the remainder scattered over other countries. The gypsies are now considered to have come from India, the main body of their language, though mixed with a great number of borrowed words, having a close affinity with some of the Indian languages. Gypsies are remarkable for the yellow brown, or rather olive colour, of their skin; the jet-black of their hair and eyes, the extreme whiteness of their teeth, and generally for the symmetry of their limbs. The typical Gypsies rarely settle permanently anywhere, but live in tents, wandering about working in wood and iron, making domestic utensils, telling fortunes, practising tricks, &c. Their talent for music is remarkable, and some of their melodies have become the much-valued property of other nations, or are incorporated in some of our favourite operas. They have no peculiar religion. Amongst the Turks they are Mohammedans; and in Spain at least, as well as in Transylvania, they follow the forms of the Christian religion, without, however, caring for instruction, or having any real interest in religion. The marriage ceremony is of the simplest kind. If the husband becomes tired of his wife, he will turn her off without ceremony. There is no idea of education amongst them. The children grow up in idleness and the habits of stealing and cheating. The Gypsies first appeared in Germany and Italy about the beginning of the 15th century. At that time they wandered about in hordes with a commander at their head. In the Austrian States, where they are very numerous, Maria Theresa formed the plan of converting them into orderly citizens. But her ordinances that they should dwell in settled habitations, practise some trade, and send their children to school remained to a large extent ineffectual. In England the Gypsies first appeared about the beginning of the 16th century, and notwithstanding severely repressive enactments on the part of the government continued to maintain themselves as tinkers, mat and basket-makers, &c. In Scotland they were more favourably received, and frequently intermarried with the natives. The town of Yetholm, in Roxburghshire, was once a sort of headquarters for the race, and almost exclusively inhabited by Gypsies. Considerable numbers of the British Gypsies have emigrated to America, where they settle amongst the people and lose their distinctive characteristics. With regard to their language, a large number of the words in all the different dialects are of Indian origin, as already mentioned. The grammar of the tongue is also oriental, and corresponds with the Indian dialects. This similarity cannot be considered the work of chance, particularly as their persons and customs show much of the Hindu character. Amongst the chief authorities in English on the subject of the language and orgin of the Gypsies are—George Borrow's account of the Gypsies in Spain and Romano Lavo-Lil; C. G. Leland, the English Gypsies and their Language; Smart and Crofton, the Dialect of the English Gypsies.

Gypsum (jip′sum), a monoclinic mineral, chemically a hydrated calcic sulphate ($CaSO_4 2H_2O$). It is found in a compact state as *alabaster*, or crystallized as *selenite*, or in the form of a soft chalky stone, which in a very moderate heat gives out its water of crystallization, and becomes a very fine white powder, extensively used under the name of plaster of Paris (which see). This last is the most common, and is found in great masses near Paris, where it forms the hill of Montmartre, near Aix in Provence, and near Burgos in Spain. Gypsum may be geologically of any age, but occurs abundantly in the more recent sedimentary formations, and is even now forming, either as a deposit from water holding it in solution, or from the decomposition of iron pyrites when the sulphuric acid combines with lime, or from the action of sulphurous vapours in volcanic regions on calcareous rocks. When gypsum occurs without water it is called *anhydrite*, but in its most ordinary state it is combined with water. Of this latter there are six sub-

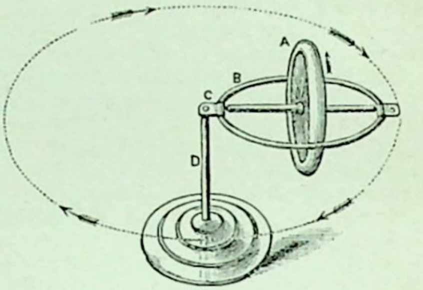
species: sparry gypsum or selenite, the foliated granular, the compact, the fibrous, the scaly foliated, the earthy. The plaster-stone of the country near Paris, ground and mixed with water, is used as a mortar in building; when mixed with glue instead of water the material is known as stucco. Gypsum, pulverized by grinding or burning, has been used with good effect as a manure, especially as a top-dressing for meadows.

Gypsy-wort, *Lycŏpus europæus*, a labiate plant found in Britain in ditches and on river banks. It yields a dye said to be used by the Gypsies to render their skin darker.

Gyrenceph′ala (ji-), one of the four subclasses into which Owen has divided the mammalia, characterized by having the hemispheres of the cerebrum covering the greater part of the cerebellum and the olfactory lobes. It comprehends the Quadrumana, Carnivora, Artiodactyla, Perissodactyla, Proboscidea, Sirenia, and Cetacea.

Gyrfalcon, or JERFALCON. See *Falcon*.

Gyroscope (jī′-), an apparatus, consisting of a rotating disc mounted by very accurately fitted pivots in a ring or rings (forming a sort of gimbals), for illustrating the properties of rotation generally. The fundamental principle of the whole is the resistance which a disc in rapid motion presents to any change of direction in the axis of rotation. Some curious phenomena may be exhibited by it difficult to explain without resorting to mathematical formulæ. The figure shows a simple gyroscope. If the



Gyroscope.

disc A which revolves on an axis within the ring B is set very rapidly in motion by the unwinding of a string round the axis, and if the part C is then rested on a pivot at the top of the upright support D, the apparatus instead of falling will go slowly round in the direction shown by the arrows.

Gyula (dyö′lȧ), a market town of Hungary, on the Körös. It consists of two distinct villages, Magyar and Nemet (German), on opposite sides of the river. Pop. 18,046.

H.

H, the eighth letter of the English alphabet, often called the *aspirate*, as being a mere aspiration or breathing, though not the only aspirated letter in English. The sound that distinctively belongs to it is that which it has at the beginning of a syllable before a vowel, as in *hard*, *heavy*. It is very commonly joined to other consonants to represent sounds for which there are no special letters in the alphabet, as in the digraphs *ch*, *sh*, *th* (*child*, *ship*, *thin*, *this*), or in other consonantal combinations of various origins and values, as in the words *enough* (*gh*=*f*), *plough* (*gh* silent), *philosophy* (*ph*=*f*), *rhetoric* (*h* silent), &c. *Ch* is common in words taken from the Greek, but in this case it generally has the *k* sound, as in *chemistry*, *chyle*, *logomachy*, &c. See *Grimm's Law*.

Haarlem (här′lem), a town of Holland, province N. Holland, 10 miles W. Amsterdam, intersected by the Spaarne, which is joined by canals from Leyden and Amsterdam, and along which a considerable traffic is maintained. The town is well and regularly built; the streets exceedingly clean, planted with trees and laid out in promenades. Amongst the notable buildings are the town-hall, the church of St. Bavon with its celebrated organ, the Prinsenhof, in which the provincial assembly meets. The manufactures of Haarlem, as well as its population, are less than what they were formerly; but it has still various industrial works, a celebrated type-foundry, the oldest and most famous printing-office in Holland, and its flower trade, especially in hyacinths and other bulbs, is very important. On the south side of the town is the park of Haarlem, a plantation of fine old beeches surrounded with villas, cafés, and places of holiday resort. Haarlem was a prosperous place as far back as the 12th century. During the revolt of the Netherlands it

sustained a famous seven months' siege by the Spaniards. It is the birthplace of Laurence Coster, supposed inventor of movable types, and of a number of painters, Ostade, the Wouvermans, Ruisdael, Van Loo, &c. Pop. 58,390.

Haarlem, LAKE OF, a former lake of Holland, adjoining and communicating with the Y, between Haarlem and Amsterdam. Previously a swamp, it was formed in the 15th century by the overflow of the Rhine and the crumbling away of the banks of the Y, and imperilled by its growth the towns of Haarlem, Amsterdam, and Leyden. It was 18 miles long, 9 miles broad, and about 14 feet deep. The draining of it was commenced in 1840, and completed in 1853. The soil thus reclaimed, known as the Haarlemmer Polder, now forms a commune, which numbers over 15,000 inhabitants.

Habak'kuk, the eighth of the twelve minor prophets. He flourished about 600 B.C. at the time of the invasion of Judah by the Chaldeans, against whom he prophesies God's retributive justice. He concludes with a kind of psalm (chap. 3) remarkable for the majesty of its language and the sublimity of its thought.

Habeas Corpus, in law, a writ addressed to one who has a person in custody, commanding him to produce the body of the person named at a certain place and time. From the time of the Magna Charta imprisonment at the discretion of any person has been unlawful in England, but for long the royal prerogative was so indefinite and the power of the crown so great that persons were frequently detained in custody at the discretion of the crown. It was not till the 17th century that the Habeas Corpus Act, passed in 1679 (31 Charles II. cap. ii.), provided the great remedy for the violation of personal liberty by the writ of *habeas corpus ad subjiciendum* (that you have the body to answer). The provisions of the act may be stated generally thus:—1. That on complaint or request in writing, by, or on behalf of, any person committed and charged with any crime (unless treason, felony, &c., expressed in the warrant), the lord-chancellor, or any of the judges shall award a habeas corpus for such prisoner, and shall discharge the party, if bailable, upon security being given to appear and answer to the accusation. 2. The writ shall be returned, and the prisoner brought up within a limited time, not exceeding twenty days. 3. No person once delivered by habeas corpus shall be recommitted for the same offence. 4. Every person committed for treason or felony may insist on being tried at the next assizes, or admitted to bail, and if not tried at the second assizes or sessions, he shall be discharged from the imprisonment. The writ may be applied for by persons confined in any part of England, or Jersey and Guernsey. As the writ originally had to do solely with crimes, the statute 56 Geo. III. cap. c. was passed, which extended the writ to other than criminal cases. The result is that no person can be illegally confined in England for any length of time, since some friend may always apply for a habeas corpus, which, on a good prima facie case, will be issued. If the party is confined under recognized authority, as a child by a parent, this fact must be stated. In times of great political excitement, and suspected treasonable conspiracies, the operation of the Habeas Corpus Act has been occasionally suspended. But such suspension does not enable any one to imprison without cause or valid pretext for so doing. It only prevents persons who are committed from being bailed, tried, or discharged during the suspension, leaving to the committing magistrate all the responsibility attending on illegal imprisonment. In Scotland similar protection of the liberty of the subject is secured by the Wrongous Imprisonment Act, 1701, cap. vi. The English statute has been copied in the United States without essential change, and is also a feature in the laws of the Colonies.

Habergeon (ha-bėr'jin), a jacket of chain-mail shorter than the hauberk, and without sleeves, worn in the middle ages by the squires and archers.

Habit and Repute, in Scotch law, an expression applied to denote something so notorious that it is taken without further proof to be true. Thus, marriage may be established by habit and repute, where the parties cohabit and are recognized by the neighbours as man and wife. Also if a person is by habit and repute a thief, that is, a notorious thief, the punishment inflicted is heavier.

Habitants or HABITANS, a name applied to the inhabitants of Canada, especially in Quebec province, who are of French extraction, still speak the French language and preserve French customs. See *Canada*.

Habitual Criminals Act, a British act passed in 1869 (32 and 33 Vict. cap. xcix.), to make further provision for the suppression of crimes. This statute was, however,

repealed two years after by a more comprehensive act known as the Prevention of Crimes Act (which see).

Hackberry, the popular name of the North American varieties of the nettle-tree, *Celtis crassifolia*, also of the *Celtis occidentalis*, belonging to the nettle family Urticaceæ. See *Nettle-tree*.

Hackländer (hak'len-dėr), FRIEDRICH WILHELM VON, a German novelist and comedy writer, born in 1816. He engaged first in commerce, then entered the Prussian artillery, and commenced his literary career in 1841 with Pictures from a Soldier's Life in Time of Peace. He then became successively private secretary to Baron Taubenhein, whom he accompanied to the East, and to the Crown Prince of Würtemberg. In 1849 he served with the Austrians during the war with Sardinia, and published his observations in Soldier Life in Time of War. He was ennobled by the Emperor Francis Joseph. He died in 1877. Amongst his many writings distinguished by a mixture of pathos and humour, we may mention Daguerreotypen (1842), Handel und Wandel (1850), Der Neue Don Quixote (1858), Geschichten im Zickzack (1871); of his comedies, Der Geheime Agent (1850) was the most successful.

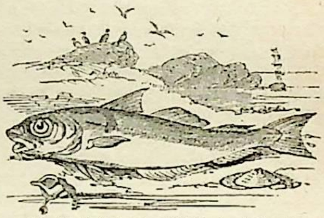
Hackmatack, a term applied in many parts of the United States to the American larch. See *Larch*.

Hackney, a municipal and parliamentary borough of London, 3 miles N.N.E. of St. Paul's. It includes Hackney proper, South Hackney, Homerton, Clapton, Dalston, &c., and is still a favourite residence of wealthy merchants. Since 1885 it returns three members to parliament. Pop. 229,531.

Hackney Coach, a coach let out for hire. Hackney coaches began first to ply under this name in London in 1625, when they were twenty in number. Hackney coachmen are generally put under police regulations, and a tariff of fares imposed upon them. Cabs are now the common kind of hackney coaches.

Haddington, a royal (formerly a parl.) burgh of Scotland, capital of the county of same name, 17 miles east by north of Edinburgh, on the Tyne. The town is neatly built, and has a town-house, a fine structure, handsome county buildings; a Gothic church of the 11th or 12th century, the nave of which forms the parish church, &c. Its grain-market is one of the largest in Scotland. Prior to 1885 it united with North Berwick, Dunbar, Lauder, and Jedburgh in sending a member to the House of Commons. Pop. 3771.—The county, also called EAST LOTHIAN, is bounded by the Firth of Forth, the German Ocean, Berwickshire, and Midlothian; area, 280 sq. miles, of which four-fifths are arable or fit for cultivation. The surface rises gently from the coast towards the Lammermuir Hills, 500 to 1700 feet high, which form its south boundary. It is divided into two nearly equal portions by the river Tyne. The minerals include coal, limestone, ironstone, and sandstone; the coal is worked. Haddingtonshire has been long celebrated for the skill and success with which its husbandry has been conducted. The low lands of the north and the west are very fertile, while the high lands adjoining the Lammermuir Hills supply excellent pasturage for sheep. Fishing and fish-curing are carried on at Dunbar and other points. The county sends a member to parliament. Pop. (1891), 37,485.

Haddock, a well-known fish of the cod family (Gadidæ), *Morrhua* (*Gadus*) *æglefinus*. It is smaller than the cod, which it much resembles, but it has a dark spot on



Haddock (*Morrhua* (*Gadus*) *æglefinus*).

each side of the body just behind the head. This fish commonly weighs from 2 to 6 lbs., though sometimes as high as 10 lbs. It breeds in immense numbers in the northern seas in February and March, and constitutes a considerable article of food. In Scotland haddocks are cured in large numbers by smoking over a wood fire.

Hadersle'ben, a town of Prussia, in Schleswig-Holstein, on the Hadersleben Fiord, in the Little Belt. Pop. 7637.

Hades (hā'dēz), originally the Greek name of the lord of the lower or invisible world, afterwards called Pluto; but in later times, as in the Greek Scriptures, it is applied to the region itself. With the ancients Hades was the common receptacle of departed spirits, of good as well as bad.

Hadj, the Mohammedan pilgrimage to Mecca, which every Mohammedan ought to perform once in his life, and after which he is entitled to prefix *Hadji* to his name. The pilgrimage has been made in disguise by Burckhardt in 1814, by Burton in 1853, and by T. F. Keane in 1878, each of whom has published accounts of his journey.

Hadji Khalifah, the surname of Mustapha-Ben-Abdallah, a Turkish historian, born at Constantinople about 1605; became 'first secretary' to Sultan Mourad IV.; and died at Constantinople in 1658. His most important work is Keshf-ul-tzunûn, a kind of encyclopædia of Arabic, Turkish, and Persian literature. Among his other works are Chronological Tables, Mirror of the World, History of the Maritime Wars of the Turks. All the works mentioned have been translated into Latin or modern languages.

Hadley, JOHN, English astronomer, born towards the end of the seventeenth century. He is the reputed inventor of the quadrant that goes by his name, though the honour is also claimed for Newton, from whom Hadley got a description of the instrument in 1727, and for Thomas Godfrey of Philadelphia, who produced his instrument about the same time as Hadley in 1731. The Royal Society decided that Godfrey and Hadley were both entitled to the honour of the invention. Hadley also invented the sextant. He died in 1744.

Hadramaut, a district of Arabia which, in the older and wider use of the term, extended from Yemen on the west to Oman on the east, and from the Indian Ocean on the south to the great desert of El Ahkaf on the north. The name is, however, generally confined by the natives to a much smaller tract in the south-west. There are some fertile valleys and glens, one of the most important being that of the Wadi-Doan, where the slopes of the mountains are covered with towns and villages, and grain crops, dates, indigo, bananas, &c., are extensively cultivated. On the coast Makallah is the chief commercial depôt.

Ha'drian, in full, PUBLIUS ÆLIUS HADRIANUS, the fourteenth in the series of Roman emperors, born at Rome, 24th Jan. 76 A.D. His father, who was cousin to the emperor Trajan, died when he was ten years old, and left him under the charge of his illustrious kinsman. He married Sabina, Trajan's grand-niece, accompanied the emperor on his expeditions, filled the highest offices of state, and, on the death of Trajan, assumed the government as his adopted son (117). He made peace with the Parthians, renouncing all conquests east of the Euphrates, and bought off a war with the Roxolani by payment of a sum of money. From the year 121 he spent most of his time in visiting the various provinces of the empire. Hadrian's policy was a peaceful one, because he saw that the further extension of the empire only weakened it. Although avoiding war as much as he could, he kept the armies in excellent condition, fortified the frontiers in Germany, and, crossing over into Britain, constructed the wall known as Hadrian's Wall (or that of Severus), which protected the Roman province from the barbarous tribes of the north. He next travelled into Asia and Africa, and lived in Athens for three years. In 131 he promulgated the Edictum Perpetuum, a fixed code of laws, which forms an important epoch in the development of Roman law. In 132 the Jews revolted, and for four years carried on a bloody war, the only notable one of his long reign. Hadrian died at Baiæ in 138.



Coin of Hadrian.

Hadrian's Wall, or the PICTISH WALL, a wall quite as often associated with the name of Severus. See *Severus* (*Wall of*).

Hadrosaurus, a genus of large extinct reptiles, whose remains have been found in the newer cretaceous strata of the United States. It appears to have resembled the gigantic iguanodon of Europe in its enormous dimensions, herbivorous habits, and anatomical structure.

Hæckel (hek'l), ERNST, a German naturalist, born at Potsdam in 1834, studied medicine and science at Berlin, Würzburg, and Vienna; travelled in Norway and Italy, became professor of zoology at Jena in 1865. Later he visited Syria, Egypt, Algeria, Ceylon, &c., to perfect his knowledge of natural forms. He is the most prominent exponent of the Darwinian theories in Germany. Among his works we may mention The Radiolariæ (1862), The History of Creation (1868), Anthropology (1874), History of the Evolution of Man (1875), Collected Popular

Discourses on the Development Theory (1878-79), Origin and Development of Animal Tissues (1884), &c.

Hæmal Cavity, in anatomy, a term applied to the cavity which contains the great centres of circulation in the Vertebrata, together with the digestive and respiratory apparatus. The *Hæmal Arch* is the arch formed by the projections anteriorly of the ribs and the sternum from the vertebræ.

Hæmanthus, the blood-flower, a genus of South African bulbous plants. See *Blood-flower.*

Hæmatem'esis, a vomiting of blood from the stomach, resulting from some disease of the stomach, as ulcer or cancer.

Hæ'matin, HEMATINE, the red colouring matter of the blood occurring in solution in the interior of the blood corpuscles or cells. It is the only structure of the body, except hair, which contains iron.

Hæ'matite, RED AND BROWN. See *Hematite* and *Iron.*

Hæmat'opus, a genus of wading birds, the best known species of which is *H. ostralĕgus*, or common oyster-catcher.

Hæmatox'ylin ($C_{16}H_{14}O_6$), the colouring matter of logwood, or *Hæmatoxylon campechianum.* This colouring matter is a constituent part of all the colours prepared with logwood, and the changes which it undergoes by the action of acids and alkalies render it useful as a reagent to detect their presence.

Hæmatozo'a (Gr. *haima*, blood, and *zōon*, a living creature), a name given to the parasitic animals which, under certain conditions, exist in the blood of mammals, birds, reptiles, fishes and many invertebrate animals. They are generally microscopic, and are thought to be connected with various diseases.

Hæmatu'ria (Gr. *haima*, blood, and *ouron*, urine), a discharge of bloody urine, usually arising from disease of the kidneys or bladder. In some parts of Africa it is an endemic disease arising from a parasite in the blood.

Hæmog'lobin, HÆMOGLOB'ULIN, the semi-fluid or quite fluid matter of a red colour contained in the red corpuscles of the blood. It can be resolved into an albuminous substance called globulin and the colouring matter hæmatin.

Hæmop'tysis (Gr. *haima*, blood, and *ptysis*, a spitting), the coughing up of blood, sometimes produced by fulness of the blood-vessels of the lungs or throat, or by the rupture of blood-vessels as a consequence of ulceration. It is distinguished from blood coming from the stomach by the comparative smallness of its quantity, and by its usually florid colour. It occurs in heart disease, in pneumonia, and tubercular disease. It is sometimes a case of vicarious menstruation.

Hæmorrhage. See *Hemorrhage.*

Hæmorrhoids. See *Hemorrhoids.*

Hæmus, in ancient geography, the chain of mountains now known as the *Balkan.*

Hafiz, MOHAMMED SHEMS ED DÎN, one of the most celebrated and most charming poets of Persia, was born at Shiraz in the beginning of the 14th century. He studied theology and law, sciences which, in Mohammedan countries, are intimately connected with each other. He preferred independent poverty as a dervish to a life at court, whither he was often invited by Sultan Ahmed, who earnestly pressed him to visit Bagdad. He died at Shiraz about 1390. His poems, known collectively as the Divan, are Anacreontic in sentiment, abounding in the praise of love and wine.

Hag, the name of the fishes of the genus *Myxīne*, which, with the allied lampreys, constitute the order of Marsipobranchii. They are of worm-like form, and have no eyes or scales, the mouth is formed for suction, is without lips, and furnished with fleshy filaments or barbels. There is a single fang upon the palate and other horny teeth by which the hag eats its way into the interior of other fishes, such as the cod, ling, or haddock. *Myxīne glutinōsa*, the common hag, is found in the British seas, and is about 12 or 15 inches long.

Hagen (hä'gėn), a thriving manufacturing town of Prussia, in Westphalia, at the confluence of the Volme and Ennepe. It has iron and steel works, manufactures of metal goods, textiles, &c. Pop. 35,478.

Hagenau (hä'gė-nou), a town of Germany, Alsace, 18 miles N. Strasburg, on the Moder. It has some manufactures, and is a centre of hop culture. Pop. 14,752.

Hagerstown, a town, United States, Maryland, 6 miles north of the Potomac river. Pop. 10,118.

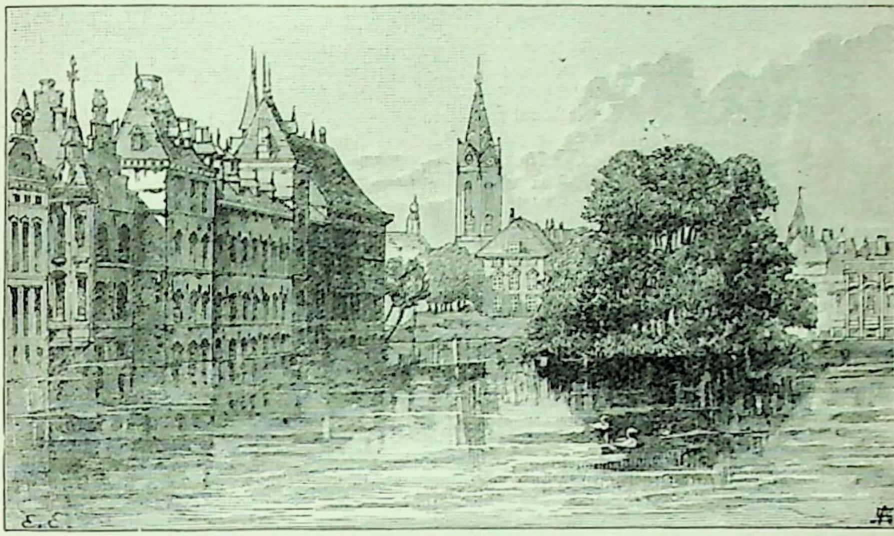
Haggai (hag'ā-ī), the tenth in order of the minor prophets, and first of those who prophesied after the captivity. The book of Haggai consists of four distinct prophetical addresses—two in the first and two in the second chapter—intended to rouse his disheartened countrymen to the rebuilding of

the temple. They were delivered in 520 B.C., and are written in a brief and meagre style.

Haggard, HENRY RIDER, English novelist, born in 1856, held several civil appointments in South Africa, and has made Africa the scene of some of his novels. He became widely known by his King Solomon's Mines (1886), and still more by his romantic She (1887), which have been followed by Allan Quatermain, Jess, Maiwa's Revenge, Cleopatra, Eric Bright-eyes, Montezuma's Daughter, Joan Haste, &c. His tales are strong in incident and adventure, but weak in character-drawing.

Hagiographa (hā-ji-og'ra-fa), a term from the Greek, meaning holy writings. See *Bible.*

Hagiology (hā-ji-ol'o-ji), that branch of literature which has to do with the history of the lives and legends of the saints.



The Hague—The Binnenhof on the Vijver or Pond.

Hague, THE (hāg; Dutch, *'S Gravenhage*—the Count's Hedge; French, *La Haye*), practically, though not formally, the capital of the Netherlands, in the province of South Holland, 33 miles south-west from Amsterdam, and within 3 miles of the sea. It is the residence of the king and of the foreign ambassadors, and the seat of the States-general of the Netherlands. It is pleasantly situated, and is distinguished for width and straightness of streets, and general elegance of public buildings. Among the most important structures are the royal palace, the palace of the Prince of Orange, the Binnenhof, a large irregular building, founded in 1249, and containing the hall of assembly of the states-general, and various government offices; also the provincial government-house, a large roomy edifice, the town-hall, royal library (200,000 vols.); the Groote Kerk, or Church of St. James, with hexagonal tower and finely vaulted interior; the Mauritshuis, built by Prince John Maurice of Nassau, now converted into a museum containing some of the finest works of the Dutch masters. There are some manufactures—iron, ordnance, gold and silver wares, hats, furniture, &c.—but the town mostly depends on the presence of the court and the numbers of strangers that come for sea-bathing to Scheveningen, about 3 miles distant. The Hague arose as a hunting-seat of the Counts of Holland in 1250, and became the political capital of the States in the 16th century. Pop. 180,454.

Haguenau. See *Hagenau.*

Hahnemann (hä'ne-mân), SAMUEL CHRISTIAN FRIEDRICH, the founder of the homœopathic system, born at Meissen in 1755, studied medicine at Leipzig, Vienna, and Erlangen, taking his degree at the last-mentioned place in 1779. After practising in various places, he published in 1810 his Organon der rationellen Heilkunde, which fully

explained his new system of curing any disorder by employing a medicine which produces a similar disorder. (See *Homœopathy*.) Hahnemann was driven from Saxony by the government prohibiting him from dispensing medicines, but found an asylum ultimately in Paris, where his system was authorized by the government and acquired a certain popularity. He died at Paris in 1843. Among his works notice is due to his Dictionary of Materia Medica, his Essays on Poisoning by Arsenic, and on the Effects of Coffee, and his treatise on Chronic Affections.

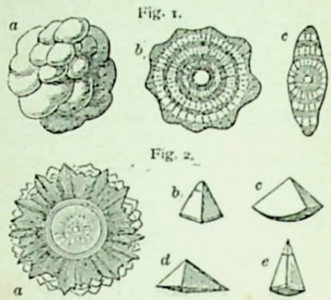
Hahn-Hahn, IDA, COUNTESS OF, German authoress, born in 1805, the daughter of Count Karl Friedrich of Hahn-Hahn, who squandered most of his means as an entrepreneur of dramatic companies. In 1826 she married a wealthy cousin, but three years later was divorced, after which she travelled extensively in Italy, Spain, and the Levant. In 1835 she made her début in literature with Poems, followed by Venetian Nights (1836), Songs and Poems (1837). But her popularity is chiefly founded on her novels, especially those of social life, amongst which Aus der Gesellschaft (1838), Gräfin Faustine (1841), Sigismund Forster (1843), may be mentioned. She died in 1880.

Haidarabad. See *Hyderabad*.

Haiducks, or HAIDUKS (Hungarian *Hajduk*, drovers), a term originally applied to the herdsmen of Hungary, and afterwards to the bands of Magyar foot soldiers, who placed themselves at the service of any potentate who was willing and able to pay them. Their fidelity to the cause of Bocskai, prince of Hungary, in the war of Succession was rewarded by a grant from that prince, in 1605, of a separate district of the country for their residence, with privileges of nobility, &c., which they continued to enjoy till 1848.

Haifa, a seaport of Palestine, on the south side of the bay of Acre, at the foot of Mt. Carmel. Pop. 7165, including 3000 Christians.

Hail, small masses of ice or frozen rain falling from the clouds in showers or storms, varying in their form, being either angular, pyramidal, or stellated, as well as in their consistency, being sometimes as hard as ice and sometimes as soft as snow. At the centre there is generally an opaque spongy mass, resembling sleet in its composition, and round this a semi-transparent congealed mass, consisting of a succession of layers or strata, is formed. Properly there are two kinds of hail—the small grains which generally fall in winter and usually before snow; and the large hail which occurs chiefly in spring and summer, and is most severe in very hot climates. The small-grained hail is



Forms of Hailstones.

Fig. 1. *a*, Hailstone which fell at Bonn in 1822: diameter 1½ inch, weight 300 grains. *b c*, Sections of differently shaped Hailstones which fell on the same occasion. Fig. 2. *a*, Section of Hailstone with minute pyramids on its surface. *b c d e*, Fragments of do. when burst asunder.

probably formed by the freezing of rain-drops as they pass in falling through colder air than that from which they started. The large or common hail is probably due to the meeting of two currents of air, of very unequal temperature and electric tension. The usual size of hailstones is about ¼ inch in diameter, but they are frequently of much larger dimensions, sometimes even 3 or 4 inches in diameter. In hot climates they are very destructive to crops.

Hailes, LORD. See *Dalrymple* (*Sir David*).

Hainan, an island of China, belonging to the province of Quang-Tung, between the China Sea and the Gulf of Tonquin, and separated from the mainland by a channel of 15 miles, encumbered with shoals and coral reefs. It is almost oval in shape, and has an area of over 16,000 square miles. The fertile lowlands on the northern and western coasts are occupied by immigrant Chinese, to the number of about 1,500,000, who cultivate rice, sugar, tobacco, &c. The fisheries are also productive. The interior, which is mountainous and covered with forests, is inhabited by a distinct race still in a very primitive stage. The capital is Kiang-chow, on the northern coast, a large seaport.

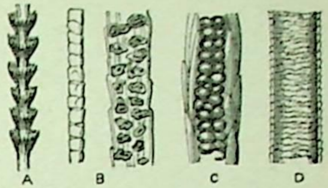
Hainaut, or HAINAULT (ā-nō; Dutch, *Henneyowen*; German, *Hennegau*), province of Belgium, bounded on the south and west

by France; area, 1406 square miles. Though nowhere properly mountainous, it is very hilly in the south-east, where it is covered by the Western Ardennes. In other directions it is generally flat, though well diversified. About three-fourths of the whole surface is arable, and scarcely a hundredth part is waste. The soil is generally fertile, and there are extensive coal-fields, coal, together with flax, linen, hemp, tobacco, and porcelain being the chief articles of export. Manufactures, chiefly cutlery, woollen and linen goods, &c., are carried on to a great extent. The capital is Mons. Population, 1,029,885. The old province of Hainault, in Cæsar's time the native district of the Nervii, was in the tenth century governed by a race of counts, the succession of which continued unbroken till 1436, when Jacqueline, heiress of William IV., was forced to cede her lands to Philip, duke of Burgundy. With Mary of Burgundy, Hainault passed to the house of Austria, but in 1659 a part of it was ceded to France, and is now included in the department of Nord.

Hainburg, or HAIMBURG (hīn'bụr*h*, hīm'bụr*h*), a town of Lower Austria, beautifully situated on the Danube, 27 miles south-east of Vienna. It is walled; has an ancient town-house, remains of a Roman aqueduct, and other antiquities. The old castle on the height is the Heimburc of the Nibelungenlied, the old frontier fortress of the Huns. Pop. 4857.

Hainichen (hī'ni*h*-en), a town of Saxony, 41 miles south-east of Leipzig. It has manufactures of woollen, linen, and cotton cloth, and is the chief seat of the German flannel manufacture. Pop. 8053.

Hair, the fine, threadlike, more or less elastic substance, of various form and colour, which constitutes the covering of the skin in the class of mammalia. It has the same use as feathers in birds, and scales in fishes and reptiles. No species of mammalia is without hair in an adult state, not even the Cetacea. In quadrupeds it is of the most various conformation, from the finest wool to the quills of a porcupine or the bristles of the hog. The human body is naturally covered with long hair only on a few parts; yet the parts which we should generally describe as destitute of it produce a fine, short, colourless, sometimes hardly perceptible hair. The only places entirely free from it are the palms of the hands and the soles of the feet; but the body of the male often produces hair like that of the head on the breast, shoulders, arms, &c. Each hair consists of a shaft and a root. The shaft or part outside the skin does not grow; but the root embedded in the skin expands at its lower end into a swelling or bulb which is



Hairs of various animals magnified.
A, Indian bat. B, Mouse. C, Sable. D, Human.

composed of little cells and grows by forming new cells, the old ones being pressed forward and becoming part of the shaft. The colour is due to minute pigment granules in the cells of the hair. The colour of the hair is a race character; and the shape of the shaft has likewise been used in this way, transverse sections showing circular, oval, flat, or reniform outlines. The human hair varies according to age, sex, country, and circumstances. At birth an infant generally has light hair. It always grows darker and stiffer with age. The same is the case with the eyelashes and eyebrows. At the age of puberty the hair grows in the armpits, &c., of both sexes, and on the chin of the male. The hair of men is stronger and stiffer; that of females longer (even in a state of nature), thicker, and not so liable to be shed. Connected with the hairs are small glands which secrete an oily substance, serving as a lubricant to the skin as well as the hair. These are called sebaceous glands. If the root is destroyed there is no means of reproducing the hair; but if it falls out without the root being destroyed, as is often the case after nervous fevers, the hair grows out again of itself. Each hair, indeed, lasts only a certain time, after which it falls out and is replaced by another as long as the papilla is not weakened. Grayness of hair is caused by a deficient amount of pigment granules in the hair cells. The deficiency arises at the hair bulb where the cells are produced. Any influences that affect the nutrition of the bulb may thus affect the colour as well as the growth of the hair. Baldness is caused by atrophy of the papilla, generally due to lessened circulation of the blood in the scalp. For some diseases which

have a close connection with the hair, see *Plica Polonica*, *Ringworm*, *Sycosis*. Under ordinary circumstances hair is a very stable substance. It is the last thing which decays, and it often grows after death and lasts for centuries. Hair is not acted on by water, but heated in it under pressure it decomposes, evolves sulphuretted hydrogen, and dissolves; it is also dissolved by alkalies and acids. When burned it emits a disagreeable odour as of burning horn.

Hair for manufacture is furnished chiefly from the horse, the ox, the hog, the goat, especially the Angora or Mohair goat, the camel, and the alpaca. That of the first three is most used for upholstery purposes, the short hair being manufactured into curled hair for stuffing, and the long straight hair manufactured into hair-cloth for seating. The long hair is also reserved for the manufacture of fishing-lines, brushes, &c. White hair is of the most value, being most adapted for dyeing and for the manufacture of fancy articles. The horse-hair used for weaving comes chiefly from Russia, Germany, Belgium, South America, and Australia. Russia chiefly furnishes the bristles, so largely used for brushes. The sable, the minniver, the martin, the badger supply the finer brushes or hair-pencils of painters. The hair of the goat, the camel, and the alpaca is chiefly used in combination with or subordinated to wool and other fibres for spinning and weaving into dress fabrics. Human hair is used chiefly for the manufacture of wigs, curls, beards, chignons, &c. Most of the supply comes from France, Germany, and Italy, where the peasant girls sell their hair to itinerant dealers. In every case, and for any purpose, hair is always best taken from the living subject; dead hair being much inferior.

Hair-dyes, substances for giving hair some particular colour desired. The numerous preparations sold for this purpose have generally a basis of lead or nitrate of silver. Bismuth, pyrogallic acid, sulphur, the juice of green walnut shells and other astringent vegetable juices, are also employed.

Hair-grass (*Aira*), a genus of grasses belonging to that division of the order in which the spikelets have two or more florets, and the inflorescence is a loose panicle. It is of little use for cattle, which dislike it, but may serve where covert is wanted for game. *A. cæspitōsa*, or tufted hair-grass, the windlestrae of the Scotch, is used as thatch for ricks, and in some places for making mats.

Hair-powder, a preparation of pulverized starch and some perfume, formerly much used to whiten the head. Sometimes the powder was coloured. The custom of wearing it was introduced from France into England in the reign of Charles II. To make the powder hold, the hair was usually greased with pomade. It is now scarcely to be seen except on the heads of footmen in attendance on people of rank or wealth.

Hair-spring, in watches, the fine hair-like spring made of steel, which is attached to the axle of the balance wheel, and serves by its resisting power to equalize the vibrations of the escapement-wheel.

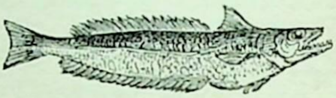
Hair-worms. See *Nematelmia*.

Haiti. See *Hayti*.

Hajilij, an Egyptian, Indian, and African tree of the genus *Balanites* (*B. ægyptiaca*), nat. order Simarubeæ, cultivated for its edible fruit, from the seeds of which an oil is expressed.

Hajipur, a town of India, in the Muzaffarpur District, Bengal, on the Little Gandak, a short distance above its confluence with the Ganges. Its command of water traffic gives it considerable commercial importance. Pop. 21,487.

Hake, the *Merlucius vulgāris* of Europe, and the *M. albĭdus* of N. America, fishes belonging to that division of the cod family



Hake (*Merlucius vulgāris*).

or Gadidæ, which has the head much flattened, and two dorsal and one long anal fin. The European hake is known in some places as king of the herrings, on which it preys.

Hakim, a Turkish word, originally signifying *sage*, *philosopher*, and then a *physician*. *Hakim bashi* is the physician of the sultan, that is to say, the chief of the physicians, always a Turk; whilst the true physicians in the seraglio under him are western Europeans, Greeks, and Jews.

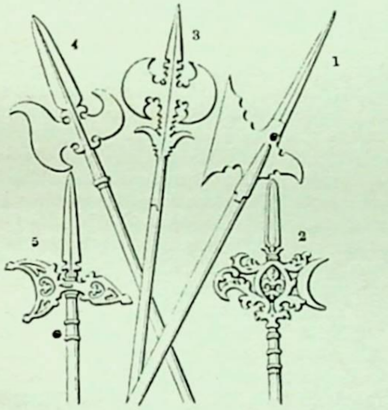
Hakluyt, Richard, one of the earliest English collectors of voyages and maritime journals, was born in 1553. He entered Christ Church College, Oxford, in 1575, and became so eminent for his acquaintance with cosmography, that he was appointed public lecturer on that science. About 1584 he went to Paris as chaplain to the English ambassador, and stayed there five

years. After his return home he prepared for the press his collection of The Principal Navigations, Voyages, and Discoveries of the English Nation, made by Sea, or over Land, within the Compass of these 1500 Years. The first volume, in folio, was published in 1589, and the third and last in 1600. Besides narratives of nearly 220 voyages, these volumes comprise patents, letters, instructions, and other documents, not readily to be found elsewhere. Hakluyt died in 1616, a prebendary of Westminster and rector of Wetheringset in Suffolk, and was interred in Westminster Abbey.

Hakoda'di, a city of Japan, near the south end of the island of Yesso, at the foot of a hill on the shore of a beautiful and spacious bay, which forms one of the best harbours in the world. Hakodadi is one of the ports opened to British commerce through Lord Elgin's treaty with the Japanese government in 1858. Pop. 63,619.

Hal, or HALLE, a town of Belgium, province of South Brabant, on the Senne, about 10 miles from Brussels. It has a fine old Gothic church and town-house; manufactures of beet-root sugar, soap, and leather. Pop. 9981.

Halacha (hal'a-ka), HALAKA (Heb. 'rule'), the Jewish oral or traditional law, as distinguished from the written law laid down in the Scriptures, and like it believed to be of divine origin. It was finally reduced to a written code forming part of the Talmud.



Halberts.

1, Halbert (time of Henry VIII.) 2, Do. with fleur-de-lis (Henry VII.) 3, Double-axed Halbert (Charles I.) 4, Halbert (Charles II.) 5, Do. (William III.)

Halberd, or HALBERT, an offensive weapon, consisting of a pole or shaft about 6 feet long, having its head armed with a steel point edged on both sides. Near the head was a cross piece of steel somewhat in the form of an axe, with a spike or hook at the back. It was much used in the English army in the 16th century, and gave its name to troops called *halberdiers*, to whom was confided the defence of the colours, and other special duties. It is now used only on ceremonial occasions.

Halberstadt (hál'bér-stát), a town of Prussia, in the province of Saxony, 32 miles s.w. of Magdeburg, on the right bank of the Holzemme. It is an old town, with many timber-framed and curiously ornamented houses. Its principal buildings are the cathedral, the Liebfrauen church, an old Episcopal palace, town-house, &c. It has considerable manufactures of carpets, soap, leather, oil, gloves, &c. Pop. 34,025.

Hal'cyon, an old or poetical name of the kingfisher. It was fabled to lay its eggs in nests that floated on the sea, about the winter solstice, and to have the power of charming the winds and waves during the period of incubation, so that the weather was then calm; whence the term, *halcyon days*. See also *Kingfisher*.

Hale, SIR MATTHEW, an eminent English judge, was born at Alderley, in Gloucestershire, in 1609. He studied at Oxford, was called to the bar, became a judge of the common bench in 1654, was knighted and made chief baron of the exchequer in 1660, was raised to the chief-justiceship of the King's bench in 1671, and died in 1676. After his death appeared his History of the Pleas of the Crown, the Jurisdiction of the Lords' House, and The History of the Common Law of England; of which there have been repeated editions, with comments. He also wrote several religious works.

Hales, ALEXANDER DE, surnamed the *Irrefragable Doctor;* an English theologian, born at Hales in Gloucestershire, date unknown, celebrated among the controversialists of the 13th century. He studied at the universities of Oxford and Paris, became, in 1230, a professor in the latter city, where he died in 1245. His Summa Theologiæ put the Sententiæ of Peter Lombard into syllogistic form. He also commented on Aristotle, on the Psalms, and the Apocalypse.

Halévy (á-lā-vē), JACQUES FRANÇOIS FROMENTAL ÉLIE, a French musical composer, born of Jewish parentage at Paris, 1799. He

studied at the conservatory under Lambert and Cherubini, and was sent to Italy to finish his musical education. Here he wrote his first two operas Les Bohémiennes and Pygmalion. The first of his pieces performed was a little comic opera, L'Artisan, given at the Théâtre Feydau in Paris, in 1827. His chef d'œuvre, La Juive, appeared in 1835, and rapidly obtained a European celebrity. Among his other works are L'Eclaire, Guido et Ginevra, La Reine de Chypre, Le Val d'Andorre, La Fée aux Roses. He died at Nice in 1862. He was a cultivated and scholarly composer but without much genius. His son, LUDOVIC HALÉVY, born in 1834, is a popular author of vaudevilles, and has written the librettos of most of Offenbach's operas.

Half-blood, in law, relationship by being born of the same father, but not of the same mother (consanguinean relationship); or born of the same mother, but not of the same father (uterine relationship). In the succession to real or landed property in England, the half-blood relations by the father's side succeed after the full-blood relations; and next, the half-blood relations by the mother's side.

Half-moon, in fortification, an outwork composed of two faces forming a salient angle, whose gorge is in the form of a crescent or half-moon.

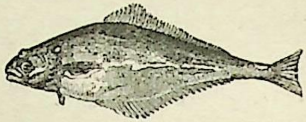
Half-pay, in the British army, is granted as a remuneration for past services, either to an officer who retires altogether from active duty after the full period of service, or to one who is compelled by ill-health, reduction of his regiment, or some exceptional cause, to quit active service for a time. The rates of half-pay are slightly in excess of half the rates of full-pay.

Half-pike, a defensive weapon, composed of an iron spike fixed on a short ashen staff, formerly used in the navy to repel the assault of boarders.

Haliaëtus (hal-i-a'ē-tus), the genus of birds to which belong the white-tailed sea-eagle of Britain, and the white-headed or bald eagle of America, the chosen symbol of the United States. See *Eagle*.

Hal'iburton, THOMAS CHANDLER, Anglo-American humorous writer, born at Windsor, Nova Scotia, in 1796. He practised as a barrister in Halifax, wrote a Historical and Statistical Account of Nova Scotia, in 1829, and contributed a series of humorous letters to a Halifax newspaper under the pseudonym of 'Sam Slick.' These were published in book form and were augmented by others, forming The Clockmaker, or Sayings and Doings of Samuel Slick. In 1842 he became judge of the Supreme Court of Nova Scotia, but subsequently gave up his professional duties and came to reside in England. Here he published the Attaché, or, Sam Slick in England. His hero again appears in Sam Slick's Traits of American Humour (1852). Another work of his of some importance is Rule and Misrule of the English in America (1851). In 1859 Judge Haliburton was elected member of parliament for Launceston. He died in 1865.

Hal'ibut, or HOL'IBUT, the *Hippoglossus vulgāris*, one of the largest of the Pleuronectidæ or flat-fish family, sometimes weighing more than 300 lbs. The fish has a compressed body, one side resembling the back and another the belly, and both eyes on the same side of the head. It is caught on both sides of the Atlantic, and is much prized for the table.



Halibut or Holibut (*Hippoglossus vulgāris*).

Halicarnas'sus, in ancient geography, the capital of Caria, in Asia Minor, once an important city. Queen Artemisia erected here, in honour of her husband, King Mausōlus, the celebrated tomb hence known as the *Mausoleum*. Halicarnassus was the native place of Herodotus.

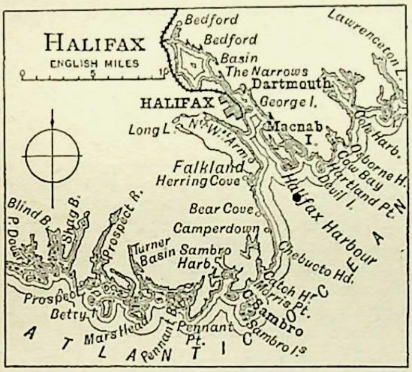
Halichondria (-kon'-), an order of sponges comprising the common sponges of the British coasts. They are found incrusting stones and sea-weed below the tide-mark, and have often elegant forms, but are unfit for any use. One species, *H. oculāta*, is popularly known as the 'mermaid's glove.'

Halicore (ha-lik'o-rē). See *Dugong*.

Hal'idon Hill, an eminence about a mile to the north-west of Berwick, the scene of a disastrous defeat of the Scots by the English, 19th July, 1333. Edward III. of England had laid siege to Berwick, the governor of which promised to surrender on 20th of July if not previously relieved. On the 19th Archibald Douglas, regent of Scotland, led a Scotch army to the relief of the town, and attacked the English at Halidon Hill, but was totally routed with the loss of 10,000 men.

Hal′ifax, a municipal and parliamentary borough of England, in the county of York (West Riding), on the Hebble, 36 miles w.s.w. York. It is built on a rising slope, and has a very picturesque appearance. The more modern streets are spacious and well paved. Among the principal buildings are the parish church of St. John the Baptist (restored 1879), All Souls' Church, the Square Church, the town-hall, market-hall, theatre, assembly rooms, infirmary, &c. There are several charitable institutions, three public parks, and two grammar-schools. Halifax commands abundant supplies of coal and water, and an extensive inland navigation connecting it with Hull and Liverpool. It is one of the centres of the woollen and worsted manufactures in Yorkshire, a great variety of goods being produced. There are also iron, chemical, and machine-making works. It became a parliamentary borough in 1832, and now sends two members to the House of Commons. Pop. (1891), 82,863.

Halifax, a city, and the capital of Nova Scotia, situated on the slope of a commanding hill, on the western side of Halifax harbour. The harbour is one of the best and most spacious in America. It is easy of



access at all seasons of the year. Its length from north to south is about 16 miles, and it terminates in a beautiful sheet of water called Bedford Basin, within which are 10 square miles of good anchorage. The harbour is well fortified, and has an extensive government dockyard. The city, which was first settled as a colony by Governor Cornwallis in 1749, has spacious and regular streets, has an elegant Province Building, a large Roman Catholic cathedral, a military hospital, theatre, university, &c. It is the principal naval station of British America, has an extensive foreign and coasting trade, and exports large quantities of fish, lumber, and coals. There are also considerable manufactures embracing iron castings, machinery, nails, soap, leather, tobacco, paper, &c. Pop. (1891), 38,556.

Halifax, Charles Montague, Earl of, an English poet and statesman, born 1661. He was educated at Westminster School and Trinity College, Cambridge. He first attracted notice by his verses, and in 1687 wrote in conjunction with Matthew Prior, The Town and Country Mouse. He entered the House of Commons as member for Malden during the Convention Parliament, became a lord of the treasury in 1692, and chancellor of the exchequer in 1694. His administration was distinguished by the adoption of the funded debt system, and by the establishment of the Bank of England. In 1700 he was raised to the peerage as Baron Halifax, was twice impeached by the House of Commons, and remained out of office during the reign of Anne. Having taken an active part in securing the succession of the house of Brunswick, George I. created him an earl, and bestowed on him the order of the Garter. He became first lord of the treasury in 1714, and died in 1715. His character was a mixture of meanness and arrogance, but his taste in literature and the arts was good, and he had a great talent for finance.

Halifax, George Saville, Marquis of, son of Sir William Saville, English statesman and writer, born 1630, died 1695. Having exerted himself for the return of Charles II. he was created Viscount Halifax in 1667, in 1669 Earl, and in 1682 Marquis of Halifax, being also keeper of the privy seal and president of the council. He supported James II., but lost his favour by opposing the repeal of the Test and Habeas Corpus Acts. He was chosen speaker of the House of Lords in the Convention Parliament, and largely contributed to the elevation of William III. to the throne. He wrote Advice to a Daughter, various political tracts, such as the Character of a Trimmer, Maxims of State, &c. He himself was a specimen of the trimmer, his conduct, however, being guided more by patriotic than personal reasons.

Halio′tis, a genus of gasteropodous molluscs, both fossil and recent, commonly called *ear-shells*, or *sea-ears*, found adhering to rocks on the shore, and remarkable for

the pearly iridescence of the inner surface. The name is derived from their likeness to an ear.

Hall, an ancient town of Austria, in the Tyrol, 6 miles east of Innsbruck, on the Inn, which is here navigable. It has very extensive salt works. Pop. 5456.

Hall, a town of Würtemberg. See *Schwäbisch-Hall.*

Hall, Basil, a naval officer and traveller, son of Sir James Hall of Dunglass, born at Edinburgh in 1788, entered the navy in 1802, and became post-captain in 1817. Amongst his principal works are: A Voyage of Discovery to the west coast of Corea and the great Loo Choo Island (1817); Extracts from a Journal (written on the Pacific coast of America); Travels in North America (1829); Fragments of Voyages and Travels; Schloss Heinfeld, or a Winter in Styria; besides many papers contributed to journals and scientific societies. Ultimately his mind gave way, and he died in Haslar Hospital, Gosport, in 1844.

Hall, Charles Francis, an Arctic explorer, born at Rochester, New Hampshire, U.S. in 1821. He began life as a blacksmith, became a journalist in Cincinnati; in 1860 organized an Arctic expedition in search of Franklin, and remained amongst the Esquimaux two years, acquiring their language and habits. In 1864 he undertook a second expedition to the same regions, where he remained till 1869. In 1871, at the instigation of Hall, the U.S. government fitted out the *Polaris* for an expedition to the North Pole, and placed Captain Hall in command. The *Polaris* sailed from New York June 29, 1871, and on 30th Aug. reached lat. 82° 16′ N., and then turned back to winter in a sheltered bay, lat. 81° 38′, where Hall died on Nov. 8. The *Polaris* was ultimately abandoned by her crew, who reached home only after experiencing many privations and adventures. An account of his first expedition was given by Capt. Hall in his Arctic Researches and Life amongst the Esquimaux.

Hall, Edward, an English chronicler, born in London about 1495. He was a lawyer by profession, and attained the rank of a serjeant, and the office of a judge in the sheriff's court. He had a seat in the House of Commons, and was a zealous Catholic. His death took place in 1547. Hall's Chronicle was published in 1548, and is a curious picture of the manners and customs of the age.

Hall, Joseph, an English prelate and writer, born 1574. He was educated at Emmanuel College, Cambridge, became successively dean of Worcester, bishop of Exeter (1627), and bishop of Norwich (1641). He agreed with the Puritans in doctrine, but disapproved of their views of church government, and took a prominent part in defending the liturgy of the church against the views published by the Nonconformists in the tract Smectymnuus. In 1642 he was sent to the Tower along with twelve other prelates who had protested against their expulsion from the House of Peers. In 1643, when the destruction of the Establishment was finally resolved on by the Puritans, he was specially named in the ordinance passed for sequestering what were called notorious delinquents, and heartlessly robbed of all his property by inquisitors, who turned him houseless into the streets. Ultimately he was allowed to take possession of a small estate which he possessed at Higham, in the vicinity of Norwich. Here he spent the remainder of his days unostentatiously, performing the duties of a faithful pastor, and died at the advanced age of eighty-two in 1656. Amongst his writings are: Virgidemiarum, a series of poetical satires written in his earlier years; A Century of Meditations; Contemplations; &c.

Hall, Marshall, English physician and physiologist, born 1790, died in 1857. He studied at Edinburgh and on the European continent, commenced practice at Nottingham in 1815, and removed to London in 1826, where he obtained a large practice. Dr. Hall was distinguished by his medical writings on diagnosis, the circulation of the blood, and female diseases; but particularly by his discoveries made public in his work on the nervous system, and by his method of restoring asphyxiated persons.

Hall, Robert, a celebrated divine among the Dissenters in England, was born at Arnsby, Leicestershire, 1764, and was the son of a Baptist minister. He studied at the Baptist College at Bristol, and afterwards at Aberdeen. In 1783 he became assistant pastor of Broadmead Church in Bristol, suffered for a time from mental alienation, recovered and became pastor of the Baptist Church at Cambridge, where he soon acquired a great reputation by his preaching and his writings, such as Apology for the Freedom of the Press (1793); Modern Infidelity (1800); Reflections on War (1802). He again became insane and

resigned his charge, but recovering married and settled at Leicester in 1808, till in 1826 he was again called to Bristol. Nearly all his life he suffered so intensely from calculus in the kidney that for twenty years he was never able to pass an entire night in bed, and could obtain rest only by a ruinous use of laudanum. He died in 1831.

Hall, Samuel Carter, English writer, born in 1800, died in 1889. He studied law and became a barrister; reported parliamentary debates for the New Times; edited in succession the Amulet, the New Monthly Magazine, and the Art Journal (1839–80), besides various popular annuals, and the Book of Gems, Book of British Ballads, and Baronial Halls. He also published Memories of Great Men and Women of the Age (1870), and The Retrospect of a Long Life (1883). He was associated with the founding of various London charities, and from 1880 received an annual civil-list pension. His wife, Anna Maria Fielding (born at Dublin 1805, died 1881), assisted him in his literary work, and was herself the author of Sketches of Irish Character, Lights and Shadows of Irish Character, Stories of Irish Peasantry, &c.

Hallam, Henry, English historian, a son of the dean of Bristol, born at Windsor in 1777. He was educated at Eton and Oxford, and studied for the law, but abandoned it for literary pursuits. His contributions to the Edinburgh Review brought him into notice, and his View of the State of Europe during the Middle Ages, which appeared in 1818, at once established his reputation. His next work, the Constitutional History of England, published in 1827, showed like the first the solid learning, patient research, accuracy and impartiality of statement, which are the characteristics of Mr. Hallam's work. In 1837–39 appeared his last great work, the Introduction to the Literature of Europe, a useful survey of literary history, though wanting in the fineness of judgment necessary for such a work. He died in 1859. His eldest son, Arthur Henry, a youth of high promise, suddenly cut off at the age of twenty-two, is the subject of Tennyson's poem, In Memoriam.

Halle (hal'lė), usually called Halle an der Saale (Halle on the Saale), to distinguish it from other places of the same name, an important German town in the Prussian province of Saxony, about 20 miles north-west of Leipzig, on the river Saale. The older streets are narrow and crooked, but the appearance of the town has of late been much improved. Among the principal buildings are the Church of the Virgin and that of St. Maurice, the 'Red Tower' (a clock-tower) in the market-place, the mediæval town-house, the ruined Moritzburg, originally the citadel, the university buildings, the Protestant cathedral, the theatre, quite a new building, and Francke's Institution, founded by Pastor Francke in 1698, comprising an orphan asylum, schools, &c. The university, with which that of Wittenberg was incorporated in 1817, is a celebrated institution founded in 1694, and attended by 1500 students. Halle has extensive trade and manufactures, chiefly chemicals, oil, malt, dyes, agricultural machines, &c., besides its celebrated salt-works. Halle is mentioned as early as 806. It was long a powerful member of the Hanseatic League. Pop. 101,452.

Halleck, Fitz Greene, an American poet, born in 1790. He became a clerk in a New York banking-house, and for years was in the employment of John Jacob Astor. In 1809 poems by him and a friend (J. R. Drake) appeared in the New York Evening Post under the signature of Croaker & Co., and attracted some attention. In 1820 he published Fanny, his longest poem, a satire on the follies and fashions of the day. In 1822 he visited Europe. Amongst his best poems are Marco Bozzaris, To the Memory of Burns, Alnwick Castle, and Red Jacket. He died in 1867.

Halleck, Henry Wager, an American general, born at Utica, near New York, in 1815, was educated for the army at West Point, and entered the engineers in 1839. In 1846 he published Elements of Military Art and Science, and he was raised to the rank of captain for his services in the Mexican war. In 1854 he left the army and settled in San Francisco as a lawyer and director of a mining company. On the outbreak of the civil war in 1861 he was created major-general in the United States army. After the victories at Paducah, Fort Henry, Fort Donelson, and the capture of Corinth, he became in 1862 commander-in-chief, till superseded by General Grant in 1864. Ultimately he received the command of the South Division at Louisville, where he died in 1872. Amongst his writings are two works on International Law.

Halleluia, or Hallelujah, or Alleluia (praise ye the Lord), a Hebrew formula of praise often occurring in the Psalms, and

which is retained in the translations of the various Christian churches, probably on account of its full and fine sound, so proper for public religious services. The *Great Halleluja* is the name given by the Jews to Psalms cxiii.-cxvii., which are sung on the feasts of the Passover and Tabernacles.

Haller, ALBRECHT VON, Swiss physician and physiologist, born in Bern 1708, studied medicine at Tübingen, and afterwards at Leyden under the famous Boerhaave. He became a public lecturer on anatomy at Bern, and afterwards physician to the hospital and principal librarian. In 1736 he was made professor of anatomy and surgery in the University of Göttingen. In 1747 his Primæ Lineæ Physiologiæ appeared, and in 1757 his Elementa Physiologiæ Corporis Humani. Amongst his other works are: Icones Anatomicæ (1743), Bibliotheca Botanica (1771), Bibliotheca Anatomica (1774), Bibliotheca Chirurgica (1774), Bibliotheca Medicinæ Practicæ (1776). He was ennobled by the Emperor Francis I., and became chief magistrate of Bern, to which he had retired in 1753. Haller had a considerable reputation as a poet. He also wrote three philosophical romances, Usong, Alfred the Great, and Fabius and Cato. He died in 1777.

Halley, EDMUND, an English mathematician and astronomer, born in 1656. He was educated at Queen's College, Oxford, published before he was nineteen a method for finding aphelia and eccentricity of planets, and stayed two years in St. Helena (1676–78) cataloguing the stars of the southern hemisphere and arranging them into constellations. In 1682 he discovered the comet which bears his name, and his prediction of its return in 1759 was the first of its kind that proved correct. He surveyed the coast of Dalmatia at the request of the German Emperor, and, returning to England, was elected Savilian professor of geometry at Oxford (1703). In 1713 he was made secretary of the Royal Society, and astronomer-royal in 1719. He died in 1742.

Halley's Comet, discovered in 1682 by Edmund Halley. (See preceding article.) Halley's demonstration that this comet was the same with the comet of 1456, 1531, and 1607 first fixed the identity of comets. It performs its revolution in about 75 years. Its last appearance was in 1835.

Halliwell-Phillipps, JAMES ORCHARD, originally J. O. HALLIWELL, Shaksperian scholar, born 1820, died 1889. In 1839 he began his editorial labours with a reprint of Mandeville's Travels. He was a leading and active member of the Percy and Shakspere societies; for the former he edited the Minor Poems of Lydgate, Early Naval Ballads of England, Nursery Rhymes of England, &c.; and for the latter, The Coventry Mysteries, Tarleton's Jests, The Fairy Mythology of Shakspere, &c. His chief Shaksperian publications are a Life of Shakspere (1848), the Works of Shakspere in 16 folio volumes, only 150 copies printed; Calendar of the Records of Stratford-on-Avon; History of New Place; and Outlines of the Life of Shakspere. He issued also 47 volumes of lithographed facsimiles of the quarto plays, and a great number of pamphlets on Shakspere, Stratford, and kindred topics. He also published a valuable Dictionary of Archaic and Provincial Words.

Hall-mark, the official stamp affixed by the Goldsmiths' Company of London and certain assay offices to articles of gold and silver as a mark of their fineness. The hall-mark generally denotes the place of manufacture or assay, as an anchor for Birmingham; a leopard's head for London; tree, salmon, and ring for Glasgow; a crown for Sheffield. The *standard-mark* for gold is a lion passant for England; for Edinburgh, a thistle; for Glasgow, a lion rampant; for Ireland, a harp crowned.

Hallow-even, or HALLOWE'EN, the evening of the 31st of October, so called as being the eve or vigil of All Hallows, or All Saints, which falls on the 1st of November. It is associated in the popular imagination with the prevalence of supernatural influences, and in Scotland is frequently celebrated by meetings of young people, with the performance of various mystical ceremonies humorously described by Burns in his poem Hallowe'en.

Hallucinations, according to Esquirol, are morbid conditions of mind in which the patient is conscious of a perception without any impression having been made on the external organs of sense. Hullucinations are to be distinguished from delusions, for in these there are real sensations, though they are erroneously interpreted. Pinel was the first who connected hallucinations with a disturbance of the phenomena of sensation, and the investigation has been pursued further by Esquirol, Maury, Brière de Boismont, and others. All the senses are not equally subject to hallucinations; the most frequent are those of hearing;

next, according to many, come those of sight, smell, touch, and taste; and hallucinations of several senses may exist simultaneously in the same individual, and also be complicated with certain delusions. The simplest form of hallucinations of hearing is the tingling of the ears; but the striking of clocks, the sounds of musical instruments and of the human voice are often heard, and in these instances, as in those of the perturbations of the other senses, there must be a diseased sensorium, though there should be no structural derangement of the nerves. Hallucinations are not confined to those whose mental faculties have been alienated, but occasionally assail and torment even the sane. Occasionally hallucinations supervene where the system is healthy, and the individual fully conscious of the unreality of the objects that address his senses, and this disorder is often associated with much ability and wisdom in the conduct of life. Amongst well-known and authenticated hallucinations are that of the second Earl Grey, who was haunted by a gory head, which, however, he could dismiss at will, and that of Bernadotte, king of Sweden, who was beset in his rides by a woman in a red cloak, although perfectly conscious of the hallucination under which he laboured.

Halluin (ál-ú-an), a town of France, dep. of Nord, on the right bank of the Lys, 10 miles N.N.E. of Lille. It has considerable manufactures of cloths, linen, and calicoes, besides cotton and oil mills, &c. Pop. 9327.

Hallux, the innermost of the five digits which normally compose the hind foot of a vertebrate animal; in a person the great toe, in a bird the hind toe.

Halmstadt (hálm'stát), a seaport of Sweden, on the Cattegat, at the mouth of the Nissa. It has cloth-making, brewing, salmon fisheries, and a trade in deals, lumber, pitch. Pop. 8700.

Ha'lo, the name given to coloured circles of light sometimes seen round the sun or moon, and to other connected luminous appearances. These phenomena are classified as: (1) *halos proper*, consisting of complicated arrangements of arcs and circles of light surrounding the sun or moon, accompanied by others tangent to or intersecting them; (2) *coronas*, simple rings, generally somewhat coloured; (3) *aureolas*, the name given to the kind of halo surrounding a shadow projected upon a cloud or fog-bank, or to the coloured rings observed by aeronauts on the upper surface of clouds. All these appearances are the result of certain modifications which light undergoes by reflection, refraction, dispersion, diffraction, and interference when it falls upon the crystals of ice, the raindrops, or the minute particles that constitute clouds.

Hal'ophytes, a class of plants which inhabit salt marshes, and by combustion yield barilla, as *Salsola*, *Salicornia*, and *Chenopodium*.

Halstead, a town of England, county of Essex, pleasantly situated on the Colne, 16 miles from Colchester. Pop. 6056.

Hal'tica, a genus of beetles. See *Flea-beetle*.

Halyards, HALLIARDS, or HAULYARDS, the ropes or tackles usually employed to hoist or lower any sail upon its respective yard, gaff, or stay.

Ham, one of the three sons of Noah. He had four sons—Cush, Mizraim, Phut, and Canaan—from the first three of whom sprang the tribes that peopled the African continent, as Canaan became the father of the tribes that principally occupied the territory of Phœnicia and Palestine. See *Hamites*.

Ham (ám), a town of France, dep. of Somme, on the Somme. It is an ancient place, and contains a church with fine bas-reliefs and a curious crypt; but is chiefly deserving of notice for its citadel, which served as a state-prison. Louis Napoleon (afterwards Napoleon III.) was kept prisoner here from 1840 to 1846. Pop. 3122.

Ham, the inner angle of the joint which unites the thigh and the leg of an animal, but more generally understood to mean the cured and smoked thigh of the ox, sheep, or hog, especially the last. Usually the meat is first well rubbed with salt, and a few days after it is rubbed again with a mixture of salt, saltpetre, and sugar, though sometimes the saltpetre is omitted. After lying for eight or ten days it is ready for drying. The smoking of hams consists in subjecting them to the smoke of a fire, wood being used in preference to coal in the process of smoking. A good ham should have the recently-cut fat hard and white, the lean fine-grained and of a lively red.

Hamadan', a city of Persia, on the site of the ancient Ecbatana, in the province of Irak-Ajemi, 260 miles north-west of Ispahan. It is agreeably situated near the base of a great range of mountains, has narrow and dirty streets, and is surrounded by heaps of ruins as well as by beautiful orchards

and gardens. It has extensive caravanserais and bazaars, a number of tanneries, and also considerable manufactures of carpets, woollens, and cotton stuffs. Pop. estimated at 35,000.

Ham'adryad, in Greek mythology, a kind of wood-nymph conceived to inhabit each a particular tree, with which they were born and with which they perished.

Hamadryas. See *Baboon.*

Ha'mah, or HA'MATH, a city of Syria, on the banks of the Orontes or El-Azy, on the caravan route between Aleppo and Damascus, in a well-watered and productive district. Amongst the curiosities are huge Persian water-wheels, 70 or 80 feet in diameter, which are turned by the current of the river and supply the houses and gardens with water. The famous Hamath Inscriptions were noticed by Burckhardt in



View in Hamburg Lower Harbour.

1812, but only recently examined and published. They are cut in relief on four stones of black basalt. The characters are entirely different from any others known, and no key to their decipherment has yet been discovered.

Hamamelida'ceæ, the witch-hazels, a small natural order of epigynous exogenous trees or shrubs, varying in height from 6 to 30 feet. *Hamamēlis virginica* yields the drug hazeline.

Hamba'to. See *Ambato.*

Hamburg, one of the free cities of Germany, a member of the Germanic Empire, and the greatest commercial port on the continent of Europe, is situated about 80 miles from the North Sea, on the north branch of the Elbe, which is navigable for large vessels. The town of Altona adjoins it on the west. From the Elbe proceed canals which intersect the eastern and lower part of the city in all directions, and it is also intersected by the Alster, which here forms two fine lakes, the Binnenalster and Aussenalster. The quays and harbour accommodation are very extensive. After the destructive fire of 1842 whole streets were rebuilt in a magnificent and expensive style. Hamburg is not, however, very rich in notable buildings. Amongst the most important are the church of St. Nicholas, a noble Gothic structure with a lofty tower and spire, built between 1845 and 1874; St. Peter's, another lofty Gothic edifice; St. Michael's, the largest of the churches; St. Catherine's, an ancient edifice; St. James', erected in 1354, but surmounted by a modern tower; an elegant Jewish temple; an exchange, a

noble edifice, consisting chiefly of a magnificent hall, surrounded by a fine colonnade. There are also the Johanneum institution, containing an ancient college, museums, and the city library, with about 300,000 volumes; several well-endowed hospitals; zoological and botanic gardens; the Kunsthalle, a large collection of pictures and sculpture; theatres, &c. Hamburg is of most importance on account of its great shipping trade and the business of banking, exchange, marine assurance, &c., carried on in connection with that. Its manufactures, though large, are less important, including shipbuilding, tobacco and cigar making, iron-founding, brewing, &c. In 1894 the imports by sea were £78,300,000; vessels entered with an aggregate burden of 6,000,000 tons. A great many emigrants embark here. The state of Hamburg embraces a territory of 160 sq. miles, and consists of two divisions, viz.:—City of Hamburg, with a population (rapidly increasing in recent years) of 625,552; outlying towns and bailiwicks (Cuxhaven, Ritzebüttel, &c.), pop. 56,080. The legislative power belongs in common to the senate and the house of burgesses, but the executive power is vested chiefly in the senate, which is composed of eighteen members, of whom nine must have studied law or finance, and of the other nine seven must belong to the commercial class. The members are elected for life. The house of burgesses consists of 160 members, half of whom are elected every three years by the votes of all tax-paying citizens, while the other half are chosen partly by a much-restricted franchise, and partly deputed by guilds and corporations. The annual revenue is about £3,000,000, the public debt £16,000,000. The city owes its foundation to the emperor Charlemagne, who (808-811) built a citadel and a church on the heights between the Elbe and the eastern bank of the Alster, as a bulwark against the neighbouring pagans. It became important as a commercial city in the 12th century, and in the 13th it combined with Lübeck in forming the Hanseatic League. In 1618 Hamburg was formally acknowledged a free city of the empire. During the Thirty Years' war its population and prosperity continued to increase on account of the immunity of its position, and in the following century it obtained a large share of the trade with North America. In 1810 it was formally incorporated in the French empire along with the north-western part of Germany In 1815 it joined the Germanic Confederation as a free city. In 1888 the city was included in the Zollverein or German Customs Union.

Ham'eln, a town of Germany, in Hanover, on the Weser, which is here crossed by a suspension bridge. It has many picturesque old buildings and remains. Pop. 13,675.

Ha'merton, Philip Gilbert, an English art-critic, born at Laneside, in Lancashire, in 1834, studied landscape-painting, but deviated into literature, publishing a work on Heraldry in 1851, and in 1855 The Isles of Loch Awe and other poems. In 1859 Mr. Hamerton married a French lady, and thereafter resided chiefly at Autun. He has made himself well known to the English public as a writer on art. Amongst his works are Thoughts about Art (1862), Etching and Etchers (1866), Contemporary French Painters (1867), Wenderholme (a novel, 1869), The Intellectual Life (1873), Round my House (1876), Marmorne (a novel, 1878), Modern Frenchmen (1878), Landscape (1885), French and English (1889), &c. He died in 1894.

Hamil'car, the name of several Carthaginian generals, of whom the most celebrated was Hamilcar, surnamed Barca (the lightning), the father of the great Hannibal. While quite a young man he was appointed to the command of the Carthaginian forces in Sicily, in the eighteenth year of the first Punic war, B.C. 247, when the Romans were masters of almost the whole island. For two years he defied all the efforts of the Romans to dislodge him; but the Carthaginian admiral, Hanno, having been totally defeated off the Ægates, B.C. 241, he reluctantly consented to evacuate Sicily. A revolt of the returned troops, joined by the native Africans, was successfully repressed by Hamilcar. He then entered on a series of campaigns in Spain, where he founded a new empire for Carthage. Here he passed nine years, and had brought the whole southern and eastern part of the country under Carthaginian rule when he was slain in battle against the Vettones, B.C. 229. His great design of making Spain a point of attack against Rome was ably carried out by his son Hannibal.

Ham'ilton, a royal and parliamentary burgh of Scotland, in Lanarkshire, on the Clyde, about 10 miles south-east of Glasgow. Numerous villas and gardens give it a pleasant rural aspect. Coal, ironstone, and limestone are extensively worked in the vicinity. The county buildings, town-hall.

and extensive cavalry barracks are the most important public buildings. Near the town is Hamilton Palace, seat of the Duke of Hamilton, a large building, chiefly modern. In the adjacent grounds are the ruins of Cadzow Castle and a few old oaks, the remains of Cadzow Forest. Here a herd of wild cattle are kept, white, with black ears and muzzles. Hamilton joins with Linlithgow, Lanark, Falkirk, and Airdrie in sending one member to parliament. Pop. 24,859.

Hamilton, the inland metropolis of the western district of Victoria, Australia, on the Grange Burn Creek, counties of Dundas and Normanby, 224 miles W. of Melbourne, with which it is connected by railway. The municipal area is 5100 acres, and there is a good supply of gas and water. There are a number of hotels; an hospital, town-hall, mechanics' institute, a district college, the usual government buildings, churches, and schools. The district is pastoral and agricultural. Pop. 3678.

Hamilton, the capital of the Bermudas, on the coast of the largest island, near the middle of the group. It has a landlocked harbour. Pop. 2000.

Hamilton, a town of New Zealand, prov. Auckland. Pop. 1201.

Hamilton, a thriving town of Canada, in the province of Ontario, county of Wentworth, on the south side of Burlington Bay, Lake Ontario, the principal part being built about 1 mile from the bay. It is situated in the centre of the finest grain-producing territory in America, and is an important centre of the chief Canadian railways. The public buildings, many of which are handsome, include jail and court-house, two market-houses, custom-house, theatre, numerous churches and chapels, several substantial banks, a large number of manufactories, and a splendid central school. It is the seat of an active and increasing trade, and has manufactures of paper, soap, iron goods, glass, carriages, &c. Pop. 48,980.

Hamilton, a town, United States, Ohio, capital of Butler county, on the Miami river, 25 miles N. of Cincinnati. It is a prosperous manufacturing place, has woollen and cotton factories, paper and saw mills, and iron-foundries. Pop. 17,565.

Hamilton, ALEXANDER, a distinguished American officer and legislator during the contest for independence, was born in 1757 in the island of Nevis, West Indies. At the age of sixteen he became a student of Columbia College, New York. On the outbreak of the war he received (1776) a commission as captain of artillery, and soon attracted the attention of Washington, who appointed him his aide-de-camp and employed him in the most delicate and difficult affairs. In 1781 he left the service, studied law, became a delegate from the state of New York in 1782, and in 1787 was one of the delegates who revised the Articles of Confederation. He was a strong supporter of the federal party, and by the letters which he wrote to the Daily Advertiser of New York, afterwards published under the title of The Federalist, contributed greatly to the success of the party. On the organization of the federal government in 1789, with Washington at its head, Hamilton was appointed secretary of the treasury. This office he held till 1795, when he resigned and retired into private life. In 1798 he was appointed second in command of the provisional army raised under the apprehension of a French invasion, and on the death of Washington, in 1799, he became commander-in-chief. In 1804 he became involved in a political dispute with Mr. Aaron Burr, then candidate for the governorship of New York, accepted a challenge from that gentleman, and was shot by him July 11, 1804.

Hamilton, ANTHONY, COUNT, a poet, courtier, and man of letters, was descended from a younger branch of the family of the dukes of Hamilton in Scotland, but was born in Ireland about 1646. After the death of Charles I. he went with his parents to France, but after the accession of Charles II. made frequent visits to England, and was appointed governor of Limerick by James II. Afterwards, on the ruin of the royal cause, he accompanied the king to France. His talents and agreeable manners made him a favourite in the best circles. He died at St. Germain in 1720. Count Hamilton is chiefly known by his Memoirs of Count Grammont (his brother-in-law), a lively and skilful picture of the frivolous life at the French and English courts of the time. The count's other works are Poems and Fairy Tales (burlesque), which, as well as the Memoirs, are in French, and are also remarkable for their fine wit and elegance of style.

Hamilton, FAMILY OF, a family long connected with Scotland, though probably of English origin, the name being evidently territorial. The first person of the name in Scotland of whom we have reliable information was WALTER FITZ-GILBERT of Hamil-

ton, who, in 1296, swore fealty to Edward I. of England for lands in Lanarkshire, and held Bothwell Castle for the English at the time of the battle of Bannockburn. For his early surrender of this fortress King Robert Bruce gave him important grants of land. He continued faithful to King David Bruce, and had a command at Halidon Hill under the Steward of Scotland. In 1445 the family was ennobled in the person of Sir James Hamilton of Cadyow, who was created Lord Hamilton of Cadyow. At first he adhered to the Douglases against the crown; but, deserting them opportunely, he was rewarded by large grants of their forfeited lands, and at a later period by the hand of the Princess Mary, eldest daughter of King James II., and widow of Thomas Boyd, earl of Arran. He died in 1479. His only son was JAMES, second Lord Hamilton and first Earl of Arran, who died in 1529, and was succeeded by his son JAMES, whose nearness to the throne, and his great possessions and following, made him a person of such mark and consequence that Henry II. of France gave him a grant of the duchy of Châtelherault; and his eldest son was proposed at one time as the husband of Elizabeth of England, and at another as that of Mary of Scotland. This son having become insane, the second son, LORD JOHN HAMILTON, created Marquis of Hamilton in 1599, succeeded in 1575 to the family estates. Dying in 1604 he was succeeded by his son JAMES, who was created Earl of Cambridge in 1619, and died in 1625. His son JAMES, the third marquis, one of the ablest and most distinguished of the family, created Duke of Hamilton in 1643 by Charles I. was taken prisoner by the parliamentary forces soon after the battle of Preston, and beheaded in March, 1649. A successor was created Duke of Brandon in 1711, and was killed in a duel with Lord Mohun in 1712. JAMES GEORGE, seventh duke, on the death of Archibald, duke of Douglas, in 1761, became also the male representative and chief of the *red* or Angus branch of the house of Douglas, with the titles of Marquis of Douglas and Earl of Angus. He died in 1769, and was succeeded by his brother, DOUGLAS, eighth Duke of Hamilton, who, in 1799, was succeeded by his uncle LORD ARCHIBALD HAMILTON.* He died in 1819, and was succeeded by his eldest son ALEXANDER, who, dying in 1852, was succeeded by his only son WILLIAM ALEXANDER ANTHONY ARCHIBALD. In 1843 he married the Princess Marie of Baden, and he died at Paris July 15, 1863. WILLIAM ALEXANDER LOUIS STEPHEN DOUGLAS HAMILTON, twelfth Duke of Hamilton, and ninth Duke of Brandon, premier peer of Scotland, and hereditary keeper of Holyrood House, died in 1895, and, leaving only a daughter, was succeeded by a distant kinsman. The ennobled offshoots of the Hamiltons are numerous and distinguished. Among these are the Dukes of Abercorn, the Earls of Selkirk, Orkney, and Haddington, and the Viscounts Boyne.

Hamilton, GAVIN, a Scottish painter, born in Lanark about 1730. He studied at Rome, devoting himself to historic painting. In 1773 he published at Rome a folio volume, The Italian School of Painting, illustrated with splendid plates. His illustrations of Homer are amongst his best productions. He was very successful also as a discoverer of classical antiquities. He died at Rome in 1797.

Hamilton, LADY EMMA, a celebrated beauty, the illegitimate daughter of a maid-servant and a man of rank. She was born about 1761, died at Calais 1815. At the age of thirty years she became the wife of Sir William Hamilton, British ambassador at Naples. It was while in this position that she made the acquaintance of Lord Nelson, and acquired an influence over him which was the cause of some of the least creditable incidents in the great admiral's career. She left behind her Memoirs, which have been published.

Hamilton, PATRICK, usually considered as the first Scottish reformer, was the second son of Sir Patrick Hamilton of Kincavel and Stanehouse, and of Catharine, daughter of the Duke of Albany, second son of James II. He was probably born in Glasgow in 1504, and was educated partly at St. Andrews and partly at Paris, where he took his degree in 1520. While still a boy he had been appointed Abbot of Fearn, in Rosshire, but never went into residence, settling instead at St. Andrews in 1523. Here he began to announce his convictions in the principles of the Reformation, and was summoned in 1526 by Archbishop Beaton to stand his trial for heresy. He fled to Germany, where his education as a reformer was completed by an intimate acquaintance with Luther and Melanchthon. After six months' absence he returned to Scotland, and began to preach the gospel openly at Linlithgow, but was allured by Beaton to St. Andrews under pretence of a

friendly conference, put on his trial, convicted of various heresies, and burned at the stake, March 1, 1527, in the twenty-third year of his age. His death did perhaps more to extend the principles of the Reformation in Scotland than even his life could have done.

Hamilton, Sir William, grandson of William, third duke of Hamilton, was born in Scotland in 1730. In 1761 he was elected member of parliament for Midhurst, and in 1764 he received the appointment of ambassador to the court of Naples. He devoted his leisure to science, making observations on Vesuvius, Ætna, and other volcanic mountains; and the results of his researches are detailed in the Philosophical Transactions, and in his Campi Phlegræi, or Observations on the Volcanoes of the Two Sicilies (Naples, 1776–79, three vols. folio). He took an active part in the excavation of Herculaneum and Pompeii, and collected a cabinet of antiquities, of which an account was published by D'Hancarville, in a splendid work with finely-coloured plates. Sir William's second wife was the notorious Lady Hamilton. (See *Hamilton, Lady Emma.*) He died in 1803.

Hamilton, Sir William, a metaphysician, the most acute logician and most learned philosopher of the Scottish school, was born in 1788 at Glasgow, where his father and grandfather held in succession the chairs of anatomy and botany. Having studied with distinction at Glasgow, in 1809 he entered Baliol College, Oxford, as a Snell exhibitioner, where he gained first-class honours. In 1813 he was admitted to the Scottish bar, but never acquired a practice in his profession, his taste lying much more towards the study of philosophy, in which he had already made extensive researches. In 1820 he became a candidate for the chair of moral philosophy in Edinburgh, rendered vacant by the death of Thomas Brown, but being defeated by Professor John Wilson he was obliged to content himself with the unimportant chair of universal history, forming no part of the college curriculum, to which he was appointed in 1821 by its patrons, the Faculty of Advocates. In 1829 the publication in the Edinburgh Review of his celebrated critique of Cousin's system of philosophy gave him at once a first place amongst the philosophical writers of the time. This was followed in 1830 by his criticism of Brown, and in 1831 by his article on the authorship of the Epistolæ Obscurorum Virorum. In 1836 he was appointed to the chair of logic and metaphysics in Edinburgh University. Here he gathered about him a number of ardent students, and re-established the fame of the Scottish school of metaphysicians, which had begun to wane. In 1846 he published an annotated edition of the works of Thomas Reid, and in 1854 the first volume of a similar edition of the works of Dugald Stewart. He died suddenly at Edinburgh in 1856. His lectures on logic and metaphysics were collected and edited by Dean Mansel and Professor Veitch. Hamilton's most important contributions to philosophy are connected with his doctrine of the Quantification of the Predicate in his system of logic; his theory of the 'relativity of knowledge,' in the Kantian sense, held along with an apparently incompatible doctrine of immediate perception of the non-ego; and his definition of the infinite or unconditioned as a mere negation of thought.

Hamilton, Sir William Rowan, mathematician and astronomer, was born in Dublin in 1805. Before he had completed his fourteenth year he had made himself acquainted with thirteen languages, among which were Arabic, Persian, Hindustani, Sanskrit, and Syriac. At the age of seventeen he was pronounced by a competent authority the first mathematician of his age. At Trinity College, Dublin, he gained the highest honours, and he was appointed in 1827 professor of astronomy in Trinity College, as well as astronomer-royal. He was knighted in 1835, and elected in 1837 president of the Royal Irish Academy. He contributed numerous papers to the transactions of learned bodies, and made some valuable discoveries; but his fame is chiefly founded on his invention of the calculus of quaternions, a new method in the higher mathematics. Amongst his published works are General Method in Dynamics, Algebra as the Science of Pure Time, Memoirs on Discontinuous Functions.

Hamirpur, a town of India, North-western Provinces, on the right bank of the Jumna. Pop. 7155.

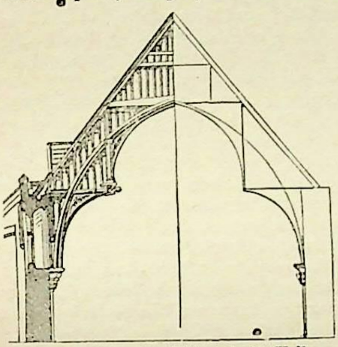
Hamites (descendants of Ham), the name given to a number of races in North Africa, who are regarded as of kindred origin and speak allied tongues. They include the ancient Egyptians and their modern descendants, the Copts, the Berbers, Tuaregs, Kabyles, the Gallas, Falashas, Somali, Dankali, &c.

Hamlet, Prince of Denmark, the hero of Shakspere's famous tragedy. The story is founded on an old tradition, related, amongst others, by Saxo-Grammaticus, of a Danish prince, Hamlet, who lived about 500 B.C., but essentially altered in details and conclusion.

Hamm, a town of Prussia, province of Westphalia, at the confluence of the Ahse with the Lippe. Its industries embrace iron-foundries and machine-works, rolling-mills and puddling-works, wire-works, &c. Pop. 22,523.

Hammer, a well-known tool used by mechanics, of which there are various sorts, but they all consist of an iron or steel head fixed crosswise to a handle of wood. See *Steam-hammer*.

Hammer-beam, a short beam attached to the foot of a principal rafter in a roof, in the place of the tie-beam. Hammer-beams are used in pairs, and project from the wall,



Hammer-beam Roof, Westminster Hall.

extending less than half-way across the apartments. The hammer-beam is generally supported by a rib rising up from a corbel below; and in its turn forms the support of another rib, constituting with that springing from the opposite hammer-beam an arch.

Hammer-cloth, a cloth sometimes used to cover the box-seat of a private carriage. It usually bears the coat of arms of the owner of the carriage.

Hammerfest, a maritime town in Norway, in Finmarken, on Hvalöe (Whale Island), a bare, treeless, barren spot, in lat. 70° 40′ N., being thus the most northerly town in the world. It is a fishing centre, and carries on a lively trade. Though within the Arctic circle, the winter is comparatively mild, and the surrounding waters seldom freeze. Pop. 2127.

Hammer-headed Shark. See *Shark*.

Hammer-oyster, a bivalve shell-fish, *Malleus vulgāris*, inhabiting the Indian Archipelago, resembling the pearl-oyster when young, but becoming always more hammer-like as it advances in age, by the lengthening of its two ears.

Hammer-Purgstall, Joseph Freiherr von, an eminent orientalist, was born in 1774 at Gratz, in Styria. He was educated at the Oriental Academy, Vienna, and when still a very young man took a share in the preparation of Meninsky's Arabic, Persian, and Turkish Lexicon. In 1799 he accompanied as interpreter to Constantinople the internuncio Freiherr von Herbert, who afterwards intrusted him with a mission to Egypt, where he collected various antiquities and manuscripts for the Imperial Library. He also accompanied, as interpreter and secretary, Sir Sidney Smith and Yussuf-Pasha in the campaign against General Menou. In 1810, on the occasion of the marriage of Napoleon with Maria Louisa of Austria, he accompanied the latter to Paris, where he became intimate with Sylvestre de Sacy and other orientalists. In 1817 he was appointed imperial councillor at the court of Austria, where he also held the post of interpreter. On succeeding to the estates of the Countess of Purgstall in 1835 he received the title of *Freiherr* (Baron). He died in 1856. Among his numerous literary works may be mentioned Constitution and Administration of the Ottoman Empire; Constantinople and the Bosporus; History of the Ottoman Empire (ten vols.); History of Turkish Poetry; History of Arabic Literature.

Hammersmith, a municipal and parliamentary borough of London, about 6 miles W.S.W. of the general post-office. The Thames is here crossed by a fine suspension bridge. Formerly celebrated for its nurseries and market-gardens, it is now a busy commercial district. Pop. (1891), 97,237.

Hammock, a rectangular piece of cloth or netting about 6 feet long and 4 feet wide, gathered together at the two ends and slung horizontally, forming a sort of bed or place in which one may recline for pleasure. Hammocks are in common use on board ships of war. The word is said to be of Caribbean origin, and the Caribs certainly make use of similar hanging beds.

Hamoon, Lake. See *Seistan*.

Hampden, John, celebrated for his patriotic opposition to taxation by prerogative, was born in London in 1594, being cousin-german by the mother's side to Oliver Cromwell. In 1609 he was entered a gentleman commoner at Magdalen College, Oxford. He began the study of law in the Inner Temple, but having inherited an ample fortune on his father's death he lived the usual life of a country gentleman. He entered parliament in the beginning of Charles I.'s reign as member for Grampound, and continued to sit in the House of Commons three times in succession as member for Wendover, and finally as member for Bucks. Although for some years a uniform opposer of the arbitrary practices in church and state, it was not till 1636 that his resistance to Charles's demand for ship-money made him the argument of all tongues. Although the decision in the Court of Exchequer was given against him by seven voices to five, the victory, as far as regarded public opinion, was his. In the following year (1637) he was one of those who meditated emigration to America, which they were prevented from carrying out by an order in council detaining them. Henceforward he took a prominent part in the great contest between the crown and the parliament, and was one of the five members whom the king, in 1642, so imprudently attempted, in person, to seize in the House of Commons. When the appeal was made to the sword, Hampden accepted the command of a regiment in the parliamentary army under the Earl of Essex, and was fatally wounded on Chalgrove Field, 24th June, 1643.

Hampshire, Hants, or Southamptonshire, a maritime county, including the Isle of Wight, in the south of England; area, 1,037,764 acres. Its surface is pleasantly varied with gently rising hills, fruitful valleys, and extensive woodlands. The coast-line is very irregular; the principal indentation, Southampton Water, is navigable almost to its head for vessels of considerable burden. The country is well watered by the Avon, Exe, Test, Itching, and Hamble. In the west is the New Forest; in the south-east are the Forests of Bere and Waltham Chase. Two ranges of chalk hills, the North and South Downs, traverse the county, running in direction nearly east and west. On the Downs large flocks of sheep known as the 'Hampshire Downs' are fed. Hampshire is also famous for its wool, bacon, honey, and timber. The manufactures are unimportant, but the shipping is very extensive. For parliamentary purposes it is divided into six divisions, viz.: Northern or Basingstoke, Western or Andover, Eastern or Petersfield, Southern or Fareham, New Forest, and Isle of Wight; one member for each. Pop. (1891), 690,086.

Hampshire, New. See *New Hampshire.*

Hampstead, a municipal and parliamentary borough of London. It is situated on the declivity of a hill on the north-western side of the city, and has long been celebrated for its fine air and the beauty of its surroundings. Hampstead Heath crowns the summit of the hill, and is now sprinkled over with handsome villas. It returns one member to parliament. Pop. (1891), 68,425.

Hampton, a village of Middlesex, situated 14 miles s.w. of London, on the left bank of the Thames. Pop. 5822. About a mile from the village are the palace and park of Hampton Court, originally built by Cardinal Wolsey in 1525. Hampton Court has been the residence of many sovereigns, from Henry VIII., to whom it was presented by Wolsey, down to George II. It contains a valuable collection of pictures by Holbein, Lely, Kneller, West, &c. Part of the palace is set apart for the residence of persons of rank in reduced circumstances. The gardens comprise about 44 acres.

Hampton Court Conference, a conference which took place in 1604 at Hampton Court under the presidency of James I. between the representatives of the Episcopalian and Puritan parties in the church. The proceedings consisted largely of browbeating of the Puritan members and theological dogmatizing on the part of the king himself. A few slight alterations were made in the Common Prayer Book, and it was determined that a new version of the Bible should be undertaken. This, the Authorized Version, appeared in 1611.

Hamster (*Cricētus*), a genus of rodent animals belonging to the family of the Muridæ (mice), and closely allied to the rats, which they resemble in their dentition. They are distinguished, however, by their having short hairy tails, as well as cheek-pouches in which they convey grain, peas, &c., to their winter residence. The common hamster (*C. vulgāris* or *frumentarius*) is from 10 to 12 inches without the tail, which is not more than 3 inches long. It is common in the north of Europe and Asia, but

is not found in Britain nor to the south of the Alps. It is very destructive, sometimes storing as much as 60 lbs. of corn in its burrow as winter provision. It is carnivorous as well as graminivorous, and hybernates during the colder months.

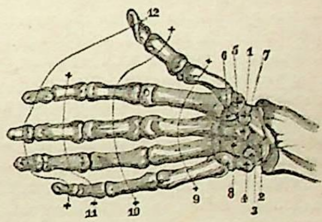
Han, a Chinese dynasty (B.C. 206 to A.D. 220) with which commences the modern history of China.

Han′aper, formerly an office in the Court of Chancery, so called because all writs regarding the public were once kept in a *hanaper* or hamper. The clerk of the hanaper received all fines due to the king for seals of charters, patents, commissions, and writs. The act 5 and 6 Vict. cap. ciii. transferred the duties of the hanaper office to other officials.

Hanau (hán′ou), a town of Prussia, province Hesse-Nassau, at the confluence of the Kinzig with the Main, 13 miles E. Frankfort. It is the chief manufacturing town in the province. It contains an ancient castle and an electoral palace (Philippsruhe), and has manufactures of jewelry, carpets, tapestry, silk and woollen goods, iron-ware, &c. During the Thirty Years' war, Ramsay, a Scotchman, held the town for nine months against the Imperialists (1635–36) till the siege was raised by the Swedes, an event still celebrated by the inhabitants; and in 1813 Napoleon here defeated the Bavarians under Wrede. Pop. 24,377.

Hanchinol, the Mexican name for *Heimia salicifolia*, a plant of the nat. order Lythraceæ, which is a powerful sudorific and diuretic, and is much in repute as a cure for venereal diseases.

Hand, the part of the body which terminates the arm, consisting of the palm and fingers, connected with the arm at the wrist; the principal organ of touch and prehension. The human hand is composed of twenty-seven bones, namely eight bones of the carpus or wrist arranged in two rows of four each, the row next the fore-arm containing the scaphoid, the semilunar, the cuneiform, and the pisiform, and that next the metacarpus, the trapezium, the trapezoid, the os magnum, and the unciform. The metacarpus consists of the five bones which form the palm, the first being that of the thumb, the others that of the fingers in succession. Lastly, the fingers proper contain fourteen bones called phalanges, of which the thumb has but two, all the other digits having three each. These bones are jointed so as to admit of a variety of movements, the more peculiar being those by which the hand is flexed backwards, forwards, and sideways, and by which the thumb and fingers are moved in different ways. The chief muscles which determine these movements are the *flexors*, which pass down the fore-arm, are attached by tendons to the phalanges of the fingers, and serve to flex or bend the fingers; and the *extensors* for extending the fingers. There are two muscles which flex all the fingers except the thumb. The thumb has a separate long and short flexor. There is a common extensor for the fingers which passes down the back of the fore-arm and divides at the wrist into four tendons, one for each finger, each being attached to all three phalanges. The fore-finger and little finger have, in addition, each an extensor of its own, and the thumb has both a short and a long extensor. The tendons of the muscles of the hand are interlaced and bound together by bands and aponeurotic fibres, and from this results a more or less complete unity of action. It is sometimes difficult to make a movement with a single finger without the others taking part in it, as in executing instrumental music, for instance; but practice gives to these movements perfect independence. Of all the movements of the hand the opposition of the thumb to the other fingers, alone or



Skeleton of Human Hand and Wrist.

1, Scaphoid bone. 2, Semilunar bone. 3, Cuneiform bone. 4, Pisiform bone. 5, Os trapezium. 6, Os trapezoides. 7, Os magnum. 8, Unciform bone. 9, Metacarpal bones of thumb and fingers. 10, First row of phalanges of thumb and fingers. 11, Second row of phalanges of fingers. 12, Third row of phalanges of thumb and fingers.

united, especially characterizes the human hand. This action of the thumb results from its length, from the first metacarpal bone not being placed on the same plane as the other four, as is the case in the monkey, and from the action of a muscle—the long flexor of the thumb—peculiar to the human hand. This muscle completes the action of

the other motor of the thumb, and permits man to hold a pen, a graver, or a needle; it gives to his hand the dexterity necessary in the execution of the most delicate work. Properly speaking then, the hand, with its highly specialized muscles, belongs to man alone. It cannot be considered, as in the ape, as a normal organ of locomotion. It is essentially the organ of touch and prehension. It moulds itself to a body to ascertain its form; it comes to the aid of the eye in completing or rectifying its impressions. The functions of touch devolve principally upon its anterior or palmar face, the nervous papillæ abounding specially at the ends of the fingers. A layer of adipose tissue, very close in texture, protects, without lessening its power or its delicacy, the network of muscles, vessels, and nerves, with which this remarkable organ is equipped.

Handcuffs, an instrument formed of two iron rings connected by a short chain or fixed on a hinge on the ends of a very short iron bar, which, being locked over the wrists of a malefactor, prevents his using his hands.

Handel (properly HAENDEL), GEORGE FREDERICK, a great German composer born at Halle on the Saale, February 23, 1685. The strong passion which he early showed for the art overcame his father's opposition to training him as a musician, and at the age of seven he was placed under the tuition of Zachau, organist of Halle Cathedral, and was soon so far advanced in the practical part of the science as to be able to officiate occasionally as deputy to his instructor. In 1696 he was sent to Berlin, where he heard the music of Bononcini and Ariosti, then at the head of the Berlin Opera House. He returned to Halle, was appointed organist of the cathedral in 1702, but soon left to visit Hanover and Hamburg, where Steffani and Reinhard Keiser, the latter the greatest German operatic composer of his day, resided. At Hamburg he played second violin in the orchestra, and brought out in 1704 his first work, an oratorio on the Passion, and his first opera, Almira, followed in February by his Nero, and subsequently by his Florinda and Daphne. In 1706 he went to Italy, visiting Florence, Venice, Naples, and Rome. On his return to Germany he entered the service of the Elector of Hanover, afterwards George I. of England, as musical director. He visited England twice, and ultimately, having received a pension from Queen Anne, settled down there. For some years his popularity was very great. He was placed at the head of the newly-founded Royal Academy of Music, and accumulated a large fortune in spite of the heavy losses which he incurred by setting up an opera company in opposition to that supported by



George Frederick Handel.

the leading nobility and the principal Italian singers. Amongst the operas which he had composed up to this date (1735) are: Radamisto, Ottone, Giulio Cesare, Flavio, Tamerlano, Scipio, Ricardo I., Orlando, Ariadne, &c. His last opera was performed in 1740. By this time he had begun to devote himself chiefly to music of a serious nature, especially the oratorio. The approval which his first works of this kind (Esther, 1731; Deborah, 1732; Athalia, 1733) had met with encouraged him to new efforts; and he produced in succession Israel in Egypt, L'Allegro and Il Penseroso, Saul, and The Messiah. The last-mentioned, which is his chief work, was brought out in 1741, for the benefit of the Foundling Hospital. It was not much appreciated at the first representation, but increased in reputation every year. In 1742 the Samson appeared, in 1746 the Judas Maccabæus, in 1748 the Solomon, and in 1752 the Jephthah. In 1752 he became blind, but did not lose his spirits, continuing to perform in public and even to compose. He died at London, 13th April, 1759. He was buried in Westminster Abbey. Handel was of large and ungainly person. His manners were rough and his temper violent, but his disposition was

humane and liberal. As a musician his characteristics are boldness and strength of style and combination of vigour, spirit, and invention in his instrumental compositions.

Hand-fish. See *Cheironectes.*

Handicapping, in horse-racing and various other games and sports, a system of equalizing the chances of victory in favour of each of the competitors by allowing certain advantages to an inferior competitor, as, in horse-racing, the making the best horses carry heavier weights proportionably to their racing qualities, or, in chess-playing, the stronger player giving up one or more of his men at the beginning of the game.

Hand-language. See *Deaf and Dumb Alphabet.*

Hand-plant, the *Cheirostĕmon platanoides,* a Mexican tree of the order Sterculiaceæ. It grows about 30 feet or more in height, and has flowers, the stamens of which present an appearance somewhat like that of the human hand.

Hands, LAYING ON OF. This rite, as a token of blessing, or the communication of spiritual gifts, or of something else which could not be literally delivered into the hands of another, has been in use from the earliest times. It occurs in Scripture as a patriarchal usage, appropriate and becoming perhaps rather than strictly religious, but later assumes more of the character of a formal rite, as in the ritual of animal sacrifice amongst the Jews, when the officer was required to lay his hands on the victim while still alive, except in the case of the paschal lamb. In the early church this rite was used in benediction, absolution, the unction of the sick, and the reconciliation of penitents as well as in ordination and confirmation. The rite is still retained by most western churches in the ceremony of ordination, and in the Roman Catholic, Anglican, and Lutheran churches both in confirmation and ordination.

Hang-Chow, or HANG-CHOO, a large city in China, capital of the province of Che-kiang, on the estuary of the Tsien-tang-kiang. It is one of the handsomest cities of China, with many magnificent temples, monuments, and triumphal arches. It has extensive manufactures in silks, furs, gold and silver ornaments, tapestries, lacquered ware, fans, &c., and a large trade. The larger portion of the inhabitants live without the walls in the beautiful suburbs and in boats on the river. It is also a great centre of literary and ecclesiastical life. Pop. estimated at 800,000.

Hanging, as a mode of execution. See *Capital Punishment.*

Hanging-buttress, in arch., a buttress not standing solid on a foundation, but supported on a corbel. It is applied chiefly as a decoration.


Hanging-buttress.

Hankow' ('Mouth of the Han'), a town and river-port in China, in the province of Hupeh, at the junction of the Han with the Yang-tse-kiang; Han-yang being on the opposite bank of the Han, and Wuchang on the other side of the Yang-tse. The port was opened to foreign trade in 1862, and has become the chief emporium for the great tea districts in the central provinces, which formerly sent their produce for export to Canton. Large steamers ascend to the town. In 1857 Hankow fell into the hands of the Taiping rebels, and was almost completely demolished by them. Pop. 750,000.

Han'ley, a municipal and parliamentary borough of North Staffordshire, England, pleasantly situated on rising ground near the Trent, 18 miles north by west of the county town of Stafford. It is quite a modern town, owing its growth entirely to the vast manufactures of china and earthenware in which the inhabitants are mostly employed; but there are also iron-furnaces, foundries, brick-works, and several important collieries. Since 1885 it returns one member to parliament. P. (1891), 86.845.

Hannay, JAMES, a Scotch man of letters, born at Dumfries in 1827, died at Barcelona Jan. 9, 1873. At an early age he entered the navy, but left it in 1845 to become a reporter on the Morning Chronicle in London. In 1860 he went to Edinburgh as editor of the Edinburgh Courant, but resigned this post in 1864. In 1868 he was appointed British consul at Barcelona. He wrote several novels, amongst which Singleton Fontenoy and Eustace Conyers are the best; also, Lectures on Satire and Satirists, Studies on Thackeray, and a Course of English Literature.

Han'nibal, or AN'NIBAL, one of the greatest generals of antiquity, born B.C. 247, was the son of Hamilcar Barca, also a general and leader of the popular party amongst the Carthaginians. He was but nine years of age when his father made him swear at the altar eternal hatred to the Romans. He grew up in his father's camp in Spain (see *Hamilcar*), but returned to Carthage when his father fell in battle, in 229 B.C.



Hannibal.

At the age of twenty-two he returned to the army in Spain, then commanded by his brother-in-law Hasdrubal, and three years after, on the murder of Hasdrubal, received the chief command by acclamation. Hannibal now prepared to carry out his great designs against Rome. His siege and capture of Saguntum, a city in alliance with Rome, led to a declaration of war from the Romans, who made preparations to carry on the war in Spain. But Hannibal, judging that Rome could be overthrown only in Italy, undertook his great march on Rome across the Pyrenees, the Rhône, and the Alps. He set out with 90,000 foot-soldiers, 40 elephants, and 12,000 horsemen. When he reached the northern foot of the Alps he had still 50,000 foot-soldiers, 9000 horse, and 37 elephants. When he arrived at the southern foot, after 15 days of incredible toils, his force had diminished to 20,000 foot-soldiers and 6000 horse. The point at which he crossed is generally believed to have been the Little St. Bernard. On the banks of the Ticino he first encountered a Roman army under Publius Scipio, and defeated it mainly by the superiority of his Numidian cavalry, 218 B.C. Shortly after another Roman army, under Sempronius, was totally routed on the Trebia. After wintering in Cisalpine Gaul, Hannibal opened next year's campaign (217) by defeating the Roman general Flaminius, whom he enticed into an ambush at Lake Thrasymenus. In this battle half the Roman army perished, and the rest were taken prisoners. Hannibal now marched into Apulia, spreading terror wherever he approached. Rome, in consternation, proclaimed Fabius Maximus dictator, who sagaciously resolved to hazard no more open battles, but exhaust the strength of the Carthaginians by delay. But for some time the wisdom of this policy was not understood by his countrymen, who, dissatisfied with his inactivity, appointed Minutius Felix his colleague. The result was that the latter was drawn into a battle by Hannibal, and would have perished but for the aid of Fabius. After this the Roman generals avoided engagements, and Hannibal at this critical period saw his army wasting away in inactivity. Next year (216), however, the rashness of the new consul Terentius Varro gave Hannibal the last of his great victories. The battle was fought at Cannæ, the Romans under L. Æmilius Paulus and Varro numbering more than 80,000 men, the Carthaginians about 50,000, and ended in a total defeat of the Romans, 40,000 or 50,000 of whom were slain and the rest scattered. Instead of marching on Rome, Hannibal now sought quarters in Capua, where luxurious living undermined the discipline and health of his troops. The campaigns of 215, 214, and 213 were comparatively unimportant. While Hannibal was seizing Tarentum (212), Capua was invested by two Roman armies. To relieve Capua Hannibal marched on Rome, and actually appeared before its gates (211), but the diversion remained fruitless, and Capua fell. In 207 a reinforcement tardily sent by the Carthaginians to Hannibal, under command of his brother Hasdrubal, was intercepted by the Romans and destroyed at the Metaurus. Hannibal now retired to Bruttium (the toe of Italy), where he still maintained the contest against overwhelming odds, till, in 203, he was recalled to defend his country, invaded by Scipio. In Africa he was defeated by the Romans at Zama (202 B.C.), and the second Punic war ended, after a bloody contest of eighteen years, in Carthage having to accept the most humiliating conditions of peace. Hannibal now devoted himself as civil magistrate to

restoring the resources of Carthage, and was working at reforms of administration and finance when the jealous Romans sent ambassadors to demand his surrender. He fled to the court of Antiochus of Syria, and offered his services for the war then commencing against the Romans. They were accepted, but Hannibal's advice for the conduct of the war was not followed, and he himself as commander of the Syrian fleet failed in an expedition against the Rhodians. In 190 B.C. Antiochus was forced to conclude a disgraceful peace with the Romans, one of the terms of which was that Hannibal should be delivered up. Hannibal, again obliged to flee, took refuge with Prusias, king of Bithynia, and is said to have gained several victories for Prusias against Eumenes, king of Pergamus, an ally of the Romans. But the Roman senate once more sent to demand the surrender of their inveterate enemy, and Hannibal, finding that Prusias could not protect him, took poison rather than fall into the hands of the Romans. He died in B.C. 183.

Hannibal, a town in the United States, in Marion county, Missouri, on the right bank of the Mississippi, 150 miles above St. Louis. It has tobacco factories, machine-shops, foundries, pork-packing establishments, saw and flour mills, and an extensive trade in lumber. Pop. 12,857.

Hanno, a Carthaginian navigator of the 5th and 6th centuries B.C., who made a voyage on the western coast of Africa for the purpose of discovery and of settling colonies. He wrote an account of his voyage, which still survives in a Greek translation known as the Periplus of Hanno. From this account Hanno would appear to have gone as far as the coast of Guinea.

Hanoi′, or KESH′O, capital of Tonquin, on the river Song-ka, in a fruitful plain. Gold and silver filagree, lacquered wares, silks, mat and basket weaving are its principal industries. Although the river is navigable only for small vessels the trade of Hanoi is considerable, chiefly with the southern provinces of China. Pop. variously estimated from 80,000 to 150,000.

Han′over (Ger. *Hannover*), formerly a kingdom in the north-west of Germany, now a province of Prussia. It is of very irregular shape, and is divided by intervening territories into three distinct portions, besides some small territories to the south, and a range of sandy islands lining the coast. The total area is 14,857 sq. miles. For administrative purposes it is divided into six districts—Hanover, Hildesheim, Lüneburg, Stade, Osnabrück, Aurich. The surface in the south is covered by the Hartz Mountains, but the rest of the country is a low, monotonous flat, with a gentle slope to the North Sea. The Ems, the Weser (with its tributaries the Leine and Aller), and the Elbe flow through fertile districts industriously cultivated for corn and flax. Near the coast the land is marshy, but feeds large numbers of very superior cattle. In Central Hanover the soil is of a barren, sandy nature. The Hartz Mountains are rich in minerals, the working of which is an important industry.—Hanover was long connected with the Brunswick family, and latterly more especially with the line of Brunswick-Lüneburg. Ernest Augustus, a prince of the latter line, became in 1692 the first Elector of Hanover, married a granddaughter of James I. of England, and was succeeded in 1698 by his son, George Louis, who in 1714 became George I. of England. Henceforth it was ruled in connection with England. In 1814 the Congress of Vienna raised Hanover to the rank of a kingdom, the crown of which was worn by George IV. and William IV., but on the accession of Queen Victoria, passed by Salic law to Ernest Augustus, duke of Cumberland. In 1851 he was succeeded by his son, George V., but in 1866, Hanover having become involved in the Austro-Prussian contest, his kingdom was occupied by Prussian troops, and absorbed into the dominions of Prussia.

Hanover, capital of the Prussian province of Hanover, situated in an extensive plain on the Leine, which here receives the Ihme and becomes navigable. The old town, irregularly built and with many antiquated buildings, is surrounded by the handsome new quarters which have arisen to the north, east, and south-east. There are fine promenades, and a large wood with beautiful walks, the Eilenriede, lies on the eastern side of the city. Amongst the principal buildings are the Market Church, the Old Town-house, the Theatre, one of the finest in Germany, the Royal Palace, the Museum of Art and Science, the Royal Library, containing 175,000 volumes, the Central Railway Station, the Waterloo Monument, &c. About a mile to the N.W. is Schloss Herrenhausen, the favourite residence of George I., George II., and George V. Nearer the town is the colossal Welfenschloss, or palace of the Guelphs, now fitted up as a polytechnic

school. Hanover is a manufacturing town of some importance, has cotton-spinning, machine-works, iron-foundries, chemical works, tobacco and cigar factories, &c. Hanover is first mentioned in 1163. It joined the Hanseatic League in 1481. It became the residence of the dukes of Brunswick-Lüneburg, and the capital of the principality in 1636. Pop. 174,455.

Han'sard, a firm of printers in London, which long printed the parliamentary debates and papers. The founder of the business was Luke Hansard, who, in 1800, became printer to the House of Commons. The reports of speeches printed were extracted from the London newspapers, but were generally sent to the speakers for revision. The name is still retained for the reports now otherwise furnished.

Hanse Towns, certain German and other commercial cities of Northern Europe associated for the protection of commerce and united by what was called the *Hanseatic League*. In the middle of the 13th century the sea and land swarmed with pirates and robbers. In particular the thriving ports of the Baltic and the North Sea were infested, and in 1219 a compact was made between Hamburg, Ditmarsh, and Hadeln to protect the adjacent waters. This was followed in 1241 by an alliance between Hamburg and Lübeck to keep open the road across Holstein, connecting the North Sea with the Baltic. In 1247 this league was joined by Brunswick, and out of this grew the Hansa or league, which at its most flourishing period embraced 85 towns, maritime and inland, from Reval and Narva to Amsterdam and Middleburg, and from Cologne to Breslau and Cracow. Amongst these the town of Lubeck was recognized as the chief town of the league. Here assembled the deputies of the other Hanse towns to deliberate on the affairs of the confederacy; but the decrees of the diet had no effect unless they received the sanction of the separate towns. The chief trading centres of the league were the factories of Novgorod in Russia, Bergen in Norway, Bruges, and London (the so-called Steelyard). These factories were subject to an almost monastic discipline, which even required their officers to be celibates and live at a common table. During the latter half of the 14th century the power of the league was at its height. It had armies and navies, gained victories in war over the kings of Norway and Denmark, and deposed a king of Sweden. It made thorough provision for the security of commerce on the Baltic and North Seas, constructed canals, introduced a uniform system of weights and measures, and developed the principles of mercantile law. But as its power and ambition increased it was felt to be an oppressive monopoly established mainly in the interests of the great seaport towns. It became less needful also for commercial security, as the princes learned the advantages of trade, formed naval forces of their own, and encouraged navigation. Most of the inland members of the confederation withdrew, and during the 15th and 16th centuries the cities of Hamburg, Lüneburg, and Lübeck were almost alone in their active efforts to maintain the power of the Hansa and secure for it the command of the Baltic. About the middle of the 16th century the Dutch became predominant in the Baltic trade. In 1597 England revoked all special privileges of the Hanseatic merchants, and in 1614 Lübeck, Stettin, Danzig, Brunswick, Lüneburg, Hamburg, Bremen, and Cologne, with a few smaller towns, were the only places that contributed to the support of the Hansa. The league still made desperate efforts to retain its monopolies, but the cost of doing so now became a heavy tax on the remaining allies. At the last general assembly, held in 1630 at Lübeck, many of the members sent representatives only to renounce their allegiance. The name still remained attached to the free cities of Lübeck, Bremen, and Hamburg, under whose protection the surviving factories continued to exist, that of Bergen being still managed in the old way till 1763. In 1813 Frankfort-on-the-Main was included in the number of the Hanse towns, and in the German Confederation these four cities had together one vote in the diet. Frankfort was incorporated in Prussia in 1866, but the other three towns are still separate constituents of the German Empire.

Hansi, town of Hissar district, Punjab, on the Western Jumna Canal. Pop. 12,656.

Hansom-cab, a two-wheeled hackney-carriage or cabriolet used in the cities and large towns of Britain, and named after the inventor. It holds two persons besides the driver, who sits on an elevated seat behind the body of the carriage, the reins being brought over the top.

Hanswurst, the name of a standing comic character on the older German stage, corresponding in its grotesque traits and mirthmaking qualities to the English clown or

Italian harlequin. The name is equivalent to the Jack Pudding of England.

Hants. See *Hampshire.*

Hanumân', in Indian mythology, the name of a fabulous monkey-god, who plays a prominent part in the epic Râmâyana. As the monkey-general who aided Rama (the seventh incarnation of Vishnu) in his war against the giant Ravana, he is worshipped as a demi-god, and on his account the whole tribe of monkeys, to which he is fabled to belong, is treated as sacred and allowed to multiply indefinitely.

Han'way, Jonas, English traveller and philanthropist, born in 1712. At an early age he was apprenticed to a merchant at Lisbon, and in 1743 became a partner in a British house at St. Petersburg. He travelled in Persia, and published An Historical Account of the British Trade over the Caspian Sea. Latterly he settled in London, where he became widely known as an active philanthropist. He is popularly known as one of the first Englishmen to persist in the regular use of an umbrella. He died in 1786.

Hapsburg (properly *Habichtsburg* or *Habsburg*, the hawk's castle), a small place in the Swiss Canton of Aargau, on the right bank of the Aar. The castle was built about 1027 by Bishop Werner of Strassburg. Werner II., who died in 1096, is said to have been the first to assume the title of Count of Hapsburg. After the death, about 1232, of Rudolph II., the family divided into two branches, the founder of one of which was Albert IV. In 1273 Rudolph, son of Albert IV., was chosen Emperor of Germany, and from him descended the series of Austrian monarchs all of the Hapsburg male line, down to Charles VI. inclusive. After that the dynasty, by the marriage of Maria Theresa to Francis Stephen of Lorraine, became the Hapsburg-Lorraine. Francis II., the third of this line, was the last of the so-called 'Holy Roman Emperors,' this old title being changed by him for that of Emperor of Austria. From the Emperor Rudolph was also descended a Spanish dynasty which began with the Emperor Charles V. (Charles I. of Spain), and terminated with Charles II. in 1700. The castle of Hapsburg is still to be seen on the Wülpelsberg.

Hapur, town of India, in the Meerut District, North-western Provinces. It has a considerable trade in sugar, grain, cotton, timber, &c. Pop. 15,000.

Har'akiri, or Sep'puku, a mode of inflicting death upon themselves allowed in Japan to criminals of the Samurai or two-sworded class as more honourable than public execution. It consists in cutting open the body so as to disembowel it by means of a wound made with one sword perpendicularly down the front and another with the other sword horizontally. It is (or was) frequently resorted to to save dishonour or exposure.

Harar, a city of North-eastern Africa, in the Italian colony of Erythræa, about 150 miles from the coast of the Gulf of Aden, formerly the capital of a small state governed by an emir. The inhabitants are strict Mohammedans. Pop. estimated at from 35,000 to 40,000.

Harbour, a general name given to any bay, creek, or inlet of the sea affording accommodation for ships and protection against the wind and sea. The great requisites of a good harbour are accessibility, adequate depth of water, and shelter from violence of wind and water. Harbours are either natural or artificial, the latter being made wholly or partly by the construction of moles or breakwaters. In connection with the more important harbours there are usually docks, in which the water is kept as nearly as possible at the same level, thus giving facility in loading and unloading. See *Breakwater* and *Docks.*

Harbour Grace, a seaport of Newfoundland, on the west side of Conception Bay. It is the seat of a R. Catholic bishop, has a handsome cathedral, and an active trade. Pop. 7054.

Harburg, a town in Prussia, in the province of Hanover, on the left bank of the South Elbe, opposite to Hamburg. It has varied manufactures and an important trade. Pop. 35,081.

Harcourt, Sir William George Granville Venables Vernon, lawyer and politician, son of the late Rev. William Vernon Harcourt, was born in 1827. He was educated at Trinity College, Cambridge, was called to the bar in 1854, became Queen's Counsel in 1866; contributed frequently to the press, in particular the letters to the Times signed 'Historicus;' was returned for Oxford city in 1869 in the Liberal interest; distinguished himself by his powers of satire and ridicule in debate; was made solicitor-general in Mr. Gladstone's ministry, Nov. 1873; home secretary in 1880, when he lost his seat for Oxford but was returned for Derby. He introduced the Arms Bill

(Ireland), 1881; Prevention of Crimes Bill, 1882; an Explosives Bill, 1883. In Feb. 1886, he became chancellor of the exchequer under Mr. Gladstone, and he held the same office under the same leader and subsequently under Lord Rosebery in 1892–95, when a change of government took place.

Harda, a town of Hindustan, in the Central Provinces. Pop. 13,600.

Hardangerfjord, a fjord on the west coast of Southern Norway with magnificent scenery.

Hardenberg, FRIEDRICH VON, German writer, better known under the name of *Novalis*, born 1772, died 1801. He studied at Jena, Leipzig, and Wittenberg, was the friend of Tieck and the Schlegels, and spent his brief life in study and literary production. He was one of the leaders of the 'romantic school,' and his writings are a strange mixture of imagination, profundity, and mysticism. Amongst his works are an unfinished novel, Heinrich von Ofterdingen, and Spiritual Songs.

Hardenberg, KARL AUGUST, PRINCE VON, Prussian chancellor of state, was born at Essenrode in Hanover in 1750. He entered the civil service of his country, but left it for that of Brunswick, and next became Prussian minister of state, and in 1804 first minister of Prussia. His conduct was vacillating, now favouring an alliance with Napoleon and again hostile to him. After the Peace of Tilsit, he was banished from the Prussian court by command of Napoleon, was recalled to office as chancellor in 1810, and after the French disaster at Moscow was amongst the first to declare that the time had now come for a general effort against Napoleon. Hardenberg signed the Peace of Paris, and was created prince. He was one of the most prominent actors at the Congress of Vienna; became president of the Prussian council of state; was present in 1818 at the Congress of Aix-la-Chapelle; in 1819 at Carlsbad; in 1820 at Troppau; in 1820–21 at Laibach; and in 1822 at Verona. He died in 1822. He abolished feudal privileges in Prussia, and was a munificent patron of the sciences.

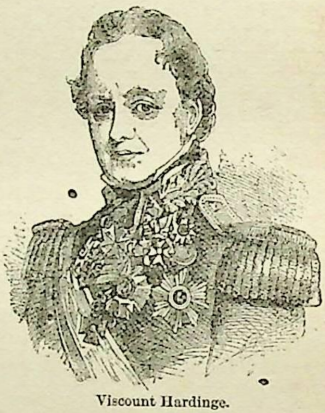
Harderwijk (hȧr′dėr-vīk), a town of the Netherlands, in the province of Gelderland, on the Zuider Zee, 30 miles east of Amsterdam. Pop. 7318.

Hard-fern, the popular name for *Lomaria spicant*, which is also known as *Blechnum boreale*. It is a very common fern, being found everywhere in Britain growing on heaths, in glens, on old roadside walls, and other places.

Hard-hack, the American popular name of a plant, the *Spiræa tomentosa*, common in pastures and low grounds, and celebrated for its astringent properties, which cause it to be used medicinally.

Hardicanute, or HARTHACNUT, King of England and Denmark, was the only legitimate son of Canute. At the time of his father's death, in 1036, he was in Denmark, where he was immediately recognized as king. His half-brother Harold, however, who happened to be in England at the time, laid claim to the throne of that part of their father's dominions, and succeeded in getting possession of Mercia, Northumbria, and Wessex, but died in 1040, when Hardicanute peacefully succeeded him. He reigned till 1042, leaving the government almost entirely in the hands of his mother and the powerful Earl Godwin, while he gave himself up to feasts and carousals.

Hardinge (hȧr′ding), HENRY, VISCOUNT, English commander, was a son of the Rev. Henry Hardinge, rector of Stanhope, Durham, and was born in 1785. He was gazetted ensign in 1798, and was present at all



Viscount Hardinge.

the great battles and sieges in the Peninsula. He lost his left hand at the battle of Ligny. He became M.P. for Durham in 1820, was made secretary-at-war, secretary for Ireland, and in 1844 succeeded Lord Ellenborough as Governor-general of India. Being forced into war by an invasion of Sikhs he took a command under Lord Gough, and after the great battles of Mudki, Ferozeshah,

and Sobraon dictated a peace in the Sikh capital of Lahore. In reward of his services he was created Viscount Hardinge and received a pension of £3000. In 1852, on the death of the Duke of Wellington, he succeeded to the post of commander-in-chief. In 1855 he was made a field-marshal, and he died in 1856.

Hardness, the quality of bodies which enables them to resist abrasion of their surfaces. In mineralogy a scale is used in which a set of standard bodies are arranged and numbered, and other bodies are referred to this scale with respect to hardness. The following is the scale given by F. Mohs:—talc 1, rock-salt 2, calc spar 3, fluor spar 4, apatite 5, felspar 6, quartz or rock-crystal 7, topaz 8, corundum 9, diamond 10. Materials, according to this arrangement, which are scratched by rock-crystal and are not scratched by felspar are said to have a hardness between 6 and 7.

Hardoi, a town of India, administrative headquarters of Hardoi district, Oudh, 63 miles from Lucknow. Pop. 10,026.

Hardouin (ár-dö-an), JEAN, a learned French Jesuit, born 1646, died 1729. He maintained the extraordinary hypothesis that all the writings under the names of the Greek and Roman poets and historians, except those of Homer, Herodotus, Cicero, and Pliny the Elder, the satires and epistles of Horace, and the Georgics of Virgil, are the spurious productions of the 13th century, written by monks under the direction of one Severus Archontius.

Hardwar, a town of India, in Saharanpur district, North-western Provinces. It is situated on the Ganges, and is one of the principal places of Hindu pilgrimage, and of the ceremonial of bathing in the sacred river. The town is of great antiquity and has interesting ruins. Pop. 29,125.

Hardware, the name usually given to the commoner articles made of iron, brass, and copper. The manufacture of such articles now forms a gigantic industry in Great Britain, especially in England, where its chief seats are Birmingham and Sheffield.

Hard-wooded Trees are usually trees of slow growth, such as the oak, beech, witch-elm, elm, ash, service-tree, walnut, chestnut, acacia, &c. They are distinguished from soft-wooded trees such as the willow, poplar, &c., and resinous trees such as the pine, fir, cedar, larch, &c.

Hardy, THOMAS, novelist, born in Dorsetshire, England, 1840. He served an apprenticeship as an ecclesiastical architect; published his first novel, Desperate Remedies, in 1872, and has since continued a series of favourite fictions. Among his best-known works are Far from the Madding Crowd, The Hand of Ethelberta, The Trumpet Major, The Woodlanders, The Return of the Native, The Mayor of Casterbridge, Tess of the D'Urbervilles, Jude the Obscure, &c.

Hare, the common name of the rodent quadrupeds of the genus *Lepus* with long ears, long hind limbs, a short tail, soft hair, and a divided upper lip; its dental formula is: incisors $\frac{4}{2}$, canines $\frac{0}{0}$, molars $\frac{6}{5}-\frac{6}{5}$ $= 28$; the two fore-feet have five and the hinder four toes. They run by a kind of leaping pace. The females produce litters of three to six about four times a year. The young leverets have their eyes open at birth. The common hare (*L. timidus*) is found throughout Europe and some parts of Asia. It is tawny red on the back and white on the belly, and is about 2 ft. long. The mountain hare or varying hare (*L. variabilis*), confined to Northern Europe and the mountainous regions of the south, is smaller than the common hare, and becomes white in winter. *L. cunicŭlus* is the rabbit, properly so called, distinguished by its smaller size and burrowing habits. (See *Rabbit.*) The American hare (*L. Americanus*), not much larger than a rabbit, is found in most parts of North America. In North America there are also the polar hare (*L. glacialis*), a variety of the varying hare (*L. variabilis*), but of superior size and purer colour; and the prairie hare (*L. campestris*), one of the species known as jackass hares or Jack-rabbits, from their size and length of limb. The hare, which has no courage and little cunning, is protected from its enemies mainly by the acuteness of its sight and hearing and its extraordinary swiftness of foot. Its voice is never heard except when seized or wounded, when it utters a sharp loud cry, not very unlike that of a child. Its flesh is rather dry, but is much prized for its peculiar flavour.

Hare, JULIUS CHARLES, an English writer on theological and social subjects, born in 1796, died 1855. He was educated at the Charterhouse, and Trinity College, Cambridge. In 1832 he became rector of Herstmonceaux, in 1840 was appointed Archdeacon of Lewes, in 1851 obtained a prebend in Chichester Cathedral, and in 1853 became one of her majesty's chaplains. In concert with his brother, Augustus William Hare, he published a well-known work entitled

Guesses at Truth by Two Brothers. His other writings include several volumes of sermons; a Memoir of John Sterling, prefixed to a collection of his writings; and a Vindication of Luther against his recent English Assailants.

Harebell, the Scotch BLUEBELL (*Campanŭla rotundifolia*), a plant of the nat. order Campanulaceæ, common on dry and hilly pastures, by roadsides, &c., in most districts of Europe, with a bell-shaped blue (sometimes white) flower. The radical leaves are cordate or reniform, the stem-leaves partly ovate or lanceolate, partly linear. Its slender stem is from 4 to 6 inches high, and bears sometimes a single flower, but more commonly more than one, in a panicle.



Harebell (*C. rotundifolia*).

Har'eld (*Harelda glacialis*), the long-tailed duck, an oceanic duck having a short thick bill, a high forehead, and two very long feathers in the tail of the male, whilst the females have the tail short and rounded. It inhabits the northern seas, and is frequent in Orkney and Shetland.

Hare-lip, a malformation consisting in a fissure or vertical division of the upper lip, sometimes extending also to the palate. Children are frequently born with this malformation, and the cleft is occasionally double. The name is given from the imagined resemblance which the part has to the upper lip of a hare. The cure of hare-lip is performed by cutting off quite smoothly the opposite edges of the fissure, and then bringing them together and maintaining them in accurate apposition till they have firmly united.

Ha'rem, HAREEM' (Ar., the prohibited), is used by Mussulmans to signify the women's apartments in a household establishment, forbidden to every man except the husband and near relations. The women of the harem may consist simply of a wife and her attendants, or there may be several wives and an indefinite number of concubines or female slaves, with black eunuchs, &c. The greatest harem is that of the Sultan of Turkey. The women of the imperial harem are all slaves, generally Circassians or Georgians. Their life is spent in bathing, dressing, walking in the gardens, witnessing the voluptuous dances performed by their slaves, &c. The women of other Turks enjoy the society of their friends at the baths or in each other's houses, and appear in public accompanied by slaves and eunuchs; but the women of the sultan's harem have none of these privileges. It is of course only the richer Moslems who can maintain harems; the poorer classes have generally but one wife.

Hare's Ear (*Bupleurum*), a plant of the nat. order Umbelliferæ. The most common British species (*B. rotundifolium*) flourishes best on a chalky soil. Under the name of *thorough-wax* it was at one time used as a vulnerary.

Harfleur (år-fleur), a town, France, dep. of Seine-Inférieure, on the Lézarde near its entrance into the Seine, 6 miles east of Havre, once the chief port at the mouth of the Seine. Pop. about 2000.

Hargreaves (hàr'grēvz), JAMES, English inventor, author of two important improvements in the art of cotton-spinning, was born near Blackburn about 1720, died 1778. In 1760 he invented a machine for carding, and some years after the spinning-jenny, by which he was able to spin with several spindles at once. Suspecting that he employed machinery, his neighbours broke into his dwelling and destroyed his machine; and on the repetition of this kind of persecution Hargreaves removed in 1768 to Nottingham. In 1770 he obtained a patent for his invention, but it was after all declared invalid on the ground that he had sold several of the machines before taking out the patent. For the rest of his life he carried on business as a manufacturer.

Har'icot, a general term for various species of kidney-bean, genus *Phaseŏlus*. They constitute a palatable and nutritious article of diet.

Hari-Kari. See *Harakiri*.

Häring (hā'ring), WILHELM, best known as Wilibald Alexis, a German novelist, born 1797, died 1871. He adopted law as a profession, but gave it up in favour of literature. In 1823 and 1827 respectively he published the novels Walladmor and Schloss Avalon, which were translated into English and other languages. These were followed by a long series of writings, consisting not only of novels and novelettes, but of books of travel, plays, ballads, &c. His most important works, however, were historic novels, such as Cabanis, Roland von Berlin, Der Falsche Waldemar, &c.

Harington, SIR JOHN, an English poet of some merit, born 1561, died 1612. At his baptism Queen Elizabeth stood sponsor.

He was in 1596 excluded from court on account of his poem Metamorphoses of Ajax, but was soon allowed to return. His best-known performance is, perhaps, his translation of Orlando Furioso in heroic verse.

Harîri, ABU MOHAMMED EL KASEM BEN ALI, surnamed El Harîri, or the silk merchant, his father's occupation, a celebrated Arabic scholar and poet, who lived chiefly at Bassorah in the time of the Abbasside caliphs, born A.D. 1054, died 1121 or 1123. He is best known by his Mekâmmât, a collection of tales narrated as incidents in the life of the hero Abu Zeid, a clever impostor who adopts every career in life, and succeeds in all to admiration.

Harlaw', BATTLE OF, in Scottish history, a battle, fought in 1411, which delivered the Lowlands from a Highland invasion and the fear of Highland supremacy. Donald, lord of the Isles, having collected an army 10,000 strong, threatened to overrun all northern Scotland, and ravaged the country until he was met at Harlaw, on the Urie, in Aberdeenshire, by a much inferior Lowland force under the Earl of Mar. The battle resulted in the defeat of Donald, although many of the Lowland gentry, the provost and chief magistrates of Aberdeen, and a large number of men fell on the field.

Harlebeke, or HAERLEBEKE (här'le-bā-ke), a town in Belgium, in West Flanders, on the Lys. It is said to be the oldest town in Flanders, and has a beautiful parish church, and a pulpit regarded as a master-piece of carving. Pop. 6000.

Harleian Library. See *Harley*.

Harlequin (Fr. *arlequin;* Ital. *arlecchino*), a character of the Italian comedy introduced on the stage of other countries. On the Italian stage he is a comic character, full of drolleries, tricks, and knaveries, and somewhat resembles the English clown. The harlequin of British pantomimes is quite different. He is supposed to be the lover of the columbine, and possesses a wonder-working wand, with which he protects his mistress against the clown and pantaloon, who pursue and endeavour to capture her, until the pursuit is brought to a termination by a good fairy. The harlequin wears a tight dress of bright colours, and glittering with spangles. See *Clown*.

Harlequin Duck (*Clangŭla histrionĭca*), a species of duck, so called on account of its party-coloured plumage of white, gray, and black. It inhabits the Arctic regions, and on rare occasions it visits the British Islands in winter. In length it is about 17 inches.

Harley, ROBERT, Earl of Oxford, English minister, born 1661, died 1724, the son of Sir Edward Harley. After the accession of Anne he and his colleague St. John, afterwards Lord Bolingbroke, became leaders of the Tories. Harley was chosen speaker of the House of Commons in 1702 under Rochester, and in 1704 was appointed chief



Robert Harley, Earl of Oxford.

secretary of state, but resigned in 1708. After the fall of Marlborough Harley became chancellor of the exchequer in 1710, and next year was created Earl of Oxford. He and Bolingbroke secured the Treaty of Utrecht (1713), but afterwards quarrelled. Early in the reign of George I. he was impeached of high treason on the ground of his alleged Jacobite intrigues. He was kept in the Tower for two years, but, owing to the inability of the Peers and the Commons to agree about the mode of procedure, he was acquitted. His patronage was extended to Swift, Pope, and other literary men, and he made a valuable collection of books and MSS., which latter are preserved in the British Museum, where they form the Bibliotheca Harleiana. Those which have been printed constitute the Harleian Miscellany.

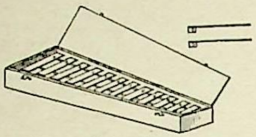
Harlingen (här'ling-en), a seaport of Holland, province of Friesland, intersected by numerous canals. It has great trade with England in corn, cattle, butter, &c. Pop. 10,735.

Harmat'tan, a hot and dry wind, which, coming from the interior of Africa, prevails

at times on the coast of Guinea in December, January, and February. Under its influence vegetation withers, and the grass becomes like hay. It is similar to the simoom of Egypt and the sirocco of Italy.

Harmo'dius. See *Hippias* and *Aristogeiton.*

Harmon'ica, Franklin's name for a musical instrument constructed with glasses of different sizes, revolving by means of mechanism worked by the foot, and played



Harmonica.

upon by touching the rim of the glasses with the moistened finger. It constituted the 'musical glasses' of Goldsmith's era. The name is now usually applied to an instrument consisting of a series of glass keys played by two small hammers.

Harmon'ics, the accessory sounds accompanying the predominant and apparently simple tone of any string, pipe, or other sonorous body. No purely simple sound, *i.e.* no sound whose vibrations are all in the same period, is producible in nature. When a sound is produced by the vibration of an open string, the whole string vibrates as a unity, giving rise to a tone called the fundamental. The string, however, further divides into various sections, which vibrate separately and more rapidly, and produce sounds differing from the fundamental, but bearing certain fixed proportions to it. The first harmonic of the fundamental note of any string is that produced by half the string, and is the octave of the first; the second harmonic is given by the third of the string, and is the fifth or dominant of the fundamental note, and so on, the complete series of harmonics containing all the notes of the musical scale. But while harmonics enter into the composition of any musical sound from any vibrating body whatsoever, the different structure of different instruments suppresses now some now others of the succession of harmonics, and a different body of tone is thus produced, distinguishing a note in one instrument from the same note in another. These differences are called in English *quality,* in French *timbre,* in German *klangfarbe.*

Har'monists, a religious sect founded at Würtemberg about the year 1788 by two brothers called George and Frederick Rapp. They endeavoured to re-establish the social practices of the early Christian church, encouraged celibacy, held all their goods in common, and taught the second advent. Persecuted by their countrymen, the followers of Rapp emigrated to America, and established themselves (1805) successfully at Harmony in Pennsylvania. They afterwards migrated to Indiana, but this venture not proving successful, they sold their land at New Harmony to Robert Owen the socialist, and finally settled at a place which they named Economy, 17 miles from Pittsburg. George Rapp died in 1847, but the community still exists.

Harmo'nium, a musical instrument of modern invention, producing sounds somewhat resembling those of the organ, resulting from the pressure of wind on a series of vibrating metallic reeds. By the action of bellows, to which the feet communicate a more or less rapid movement, the air is made to impinge against thin tongues of metal (here termed *reeds*), and to set them vibrating. These metal tongues are fitted into a slit in the top of a small box or sonorous cavity, called a wind-box, and are enabled to vibrate by being fixed only at one end. The discovery that the form of the wind-boxes determines the quality of the sound produced by the vibration of these metallic tongues contributed very much to the development of the harmonium, as it enabled the player to imitate the sound of the oboe, flute, &c. The instrument has a key-board like that of a piano, and when one of the keys is pressed down a valve is opened, which allows the wind from the bellows to rush through one of the wind-boxes and act on the vibrator. There are several stops, by means of which the performer can direct the stream of wind into the wind-boxes which produce a flute, clarionet, or any other sound. There is also a knee action, which either serves as an expression stop, or brings all the stops of the instrument into play at once, and what is called the percussion action, which consists in the application of a small hammer, which strikes the vibrator as soon as the key is pressed down, and thus aids the action of the wind. The better class of harmoniums have now usually two or more extra rows of vibrators, which, acted upon by separate stops, add so many octaves to the compass.

Harmony. See *Music* and *Counterpoint.*

Harmony, EVANGELICAL, or HARMONY OF THE GOSPELS, the title of works written with a view to prove the substantial agreement of the four evangelists. The heretic Tatian composed in the second century the Diatessaron, the first work of this kind, a continuous narrative of the events written in the gospels. From this harmony all passages were omitted which favoured the doctrine of the real humanity of Christ, and hence told against the peculiar doctrines of Tatian. Theophilus of Antioch is said to have composed a book of a similar kind, and Ammonius Saccas (died 243 A.D.) executed another Diatessaron, with the corresponding passages arranged in parallel columns. The Ten Indexes of Eusebius probably appeared in the first half of the fourth century, and was more complete than its predecessors. Among modern harmonists are Gresswell, Robinson, Tischendorf, &c.

Harmony of the Spheres, an hypothesis of Pythagoras and his school, according to which the motions of the heavenly bodies produced a music imperceptible by the ears of mortals. He supposed these motions to conform to certain fixed laws, which could be expressed in numbers corresponding to the numbers which give the harmony of sounds.

Har'motome, or CROSS-STONE, a mineral which occurs in right rectangular prisms terminated by four rhombic planes corresponding to the solid angles of the prism; but more frequently in twin-crystals formed by the intersection of two flattened prisms at right angles to each other. Its prevailing colour is white, but may be yellow, red, or brown; it is translucent or semi-transparent, with a somewhat pearly lustre, and is hard enough to scratch glass. It consists chiefly of silica, alumina, baryta, and water.

Harness, the various articles which are required to yoke a horse or another animal to any vehicle, or to control and suit them for any kind of work. See *Bit*, *Bridle*, *Collar*, *Saddle*, &c.

Haroeris. See *Horus.*

Harold (or HARALD) I., *Haarfager* (Beautiful-haired), King of Norway, one of the greatest monarchs of that country, succeeded his father in 863. He brought all the Norwegian jarls under his power, and completely subjected the country, allowing his hair to remain uncut for twenty years until he attained this object (885). Of the conquered jarls, Hrolf, or Rollo, emigrated to Neustria (France); others established themselves in Iceland, the Shetland Isles, the Faroes, and the Orkneys. In consequence of their incursions into his dominions, Harold embarked with a naval force to subdue them, and having conquered the Orkneys, &c., returned home. He fixed his residence at Trondhjem, and died there in 933.

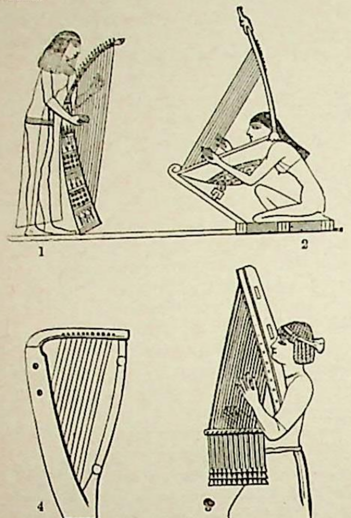
Harold III. (*Hardrada*, the Hardy), King of Norway, the son of Sigurd, a descendant of Harold Haarfager. In his youth he went to Constantinople, joined the Varangian Guard, and took part in the expedition to Italy and Sicily against the African pirates. He was ultimately appointed commander of the imperial bodyguard, and defeated the Saracens. About 1042 he returned to Norway, after having, on his way through Russia, married the daughter of the Grand-duke Jaroslav. In 1047 he succeeded his nephew, Magnus the Good, as sole king of Norway. In 1066 he joined Tostig, the brother of Harold II. of England, in an invasion of that country, but was defeated and slain at the battle of Stamford Bridge. See *Harold II.* below.

Harold I., surnamed *Harefoot*, Danish king of England, succeeded his father Canute in 1035 as king of the provinces north of the Thames, and became king of all England in 1037. His countrymen, the Danes, maintained him upon the throne against the efforts of Earl Godwin in favour of Hardicanute; and Harold latterly gained the earl over. After a reign of four years Harold died in 1040.

Harold II., King of England, born about 1022, was the second son of Godwin, earl of Kent. On the death of Edward the Confessor, Jan. 5, 1066, he stepped without opposition into the vacant throne, without attending to the claim of Edgar Atheling, or the asserted bequest of Edward in favour of the Duke of Normandy. The latter immediately called upon him to resign the crown, and upon his refusal prepared for invasion. He also instigated Harold's brother, Tostig, to infest the northern coasts of England in conjunction with the King of Norway. (See *Harold III.* above.) The united fleet of these chiefs sailed up the Humber, and landed a numerous body of men; but at Stamford Bridge, in Yorkshire, were totally routed by Harold, whose brother Tostig fell in the battle. Immediately after he heard of the landing of the Duke of Normandy at Pevensey, in Sussex. Hastening thither with all the troops he could muster, a general

engagement ensued at Senlac, near Hastings, October 14, 1066, in which Harold was slain, and the crown of England passed to William.

Haroun al Raschid. See *Harun al Rashid.*



Ancient Harps.
1, 2, Egyptian. 3, Assyrian. 4, Anglo-Saxon.

Harp, a stringed instrument of great antiquity, found among the Assyrians, Egyptians, Hebrews, Greeks, Irish, Welsh, and other nations. Its variety of form and construction was only equalled by its universality. The modern instrument is well known: its form is nearly triangular, and the strings distended from the upper part to one of the sides. It stands erect, and is played with both hands, the strings being struck or pulled with both fingers and thumbs. The instrument in its ancient forms was very defective. Egyptian harps are represented with four, seven, ten, twenty, or more strings, but we have little idea of the scale to which they were tuned. The frames are depicted as being curved in various forms, and the front pillars are wanting. The harps of the Hebrews were probably similar to the Egyptian instruments. It is probable that the various Celtic harps were derived from some oriental pattern. Among the Anglo-Saxons the harp was a favourite instrument. The modern harp was by no means an efficient instrument, until pedals were invented, an invention finally perfected by Sebastian Erard, whose patent was taken out in 1795. In 1810 he patented a double-action harp with seven pedals, each effecting two changes in the pitch of the strings. The harp thus constructed contains forty-three strings tuned according to the diatonic scale, every eighth string being a replicate in another octave of the one counted from.

Harp, Æolian. See *Æolian Harp.*

Harpe. See *La Harpe.*

Harper's Ferry, a village, United States, West Virginia, on the Potomac, at its junction with the Shenandoah, and formerly a U. S. depôt of military stores. It is famous as the scene of the unsuccessful rising headed by John Brown with a view to destroy slavery (Oct. 16, 1859). The rising was suppressed, and Brown was executed. Harper's Ferry is the seat of Stover College for coloured students. Pop. 704.

Harpies, the ancient Greek goddesses of storms. Their parentage, ages, appearance, names, and number are very differently given by the poets. In the Homeric poems they are merely storm-winds. Hesiod represents them as two young virgins of great beauty called Aëllo and Ocypete. The later poets and artists vied with each other in depicting them under the most hideous forms, covered with filth and polluting everything in contact with them. They are often represented as having female faces.



Harpy, from an antique gem.

Harpoon′, one of the principal instruments used for the capture of whales. See *Whale-fishery.*

Harp-seal. See *Seal.*

Harp-shell, the shell of a genus of molluscs (*Harpa*) belonging to the gasteropoda and to the whelk family. The species are found more especially at the Mauritius. The shells are very beautiful, but exposure to light causes their colours to fade.

Harp'sichord, a keyed, stringed instrument formerly in use, in appearance and construction similar to a grand pianoforte. In the front the keys were disposed, the long ones being the naturals, and the short ones the sharps and flats. These keys being pressed by the fingers, their inclosed extremities raised little, upright, oblong slips of wood called *jacks*, furnished with crow-quill plectrums which struck the wires, instead of the hammers of the modern pianoforte.

Harpy-eagle (*Thrasaëtus Harpyia* or *Harpyia destructor*), a rapacious bird which inhabits tropical America from Southern Mexico to Southern Brazil. It is an extremely powerful bird, and in total length slightly in excess of the golden eagle. It has, however, a somewhat shorter expanse of wing. Its shoulder muscles possess enormous strength. Its bill is powerful and crooked, and its claws are extremely strong and sharp. The harpy-eagle feeds on birds, sloths, fawns, raccoons, &c., as well as on fish, water-snakes, and the eggs of the tortoise.

Harquebuse. See *Arquebus.*

Harrier, a kind of dog employed to hunt the hare. It closely resembles the foxhound, but is smaller in size.

Harrier, the name of several hawks of the genus *Circus*, allied to the buzzards. They strike their prey upon the ground and generally fly very low. The marsh-harrier, the hen-harrier, and the ash-coloured harrier, are found in Great Britain. The marsh-harrier (*C. æruginōsus*) is from 21 inches to 23 inches long. The hen-harrier (*C. cyanĕus*) is 18 inches to 20 inches long; the adult male is of an almost uniform gray, the female brown. It is very destructive to poultry-yards, whence the name.

Harri-karri. See *Hari-kari.*

Harrington, James, a celebrated political writer, born 1611, died 1677. Having studied under Chillingworth at Oxford, and travelled on the Continent, he was, on the outbreak of the Civil war, desirous of procuring a reconciliation between the king and Parliament, but his efforts were futile. During the Protectorate he wrote his Oceana, which describes an ideal republic, and which was published in 1656. In the reign of Charles II. he was imprisoned on a charge of plotting against the government, but was released on account of the decay of his mental faculties. In addition to the Oceana he also published an English translation of four books of the Æneid.

Harris, the southern portion of the island of Lewis (which see).

Harris, James, an English philologist, born in 1709, died 1780. In 1744 he published a volume containing three treatises —on Art, on Music and Painting, and on Happiness. His most celebrated work is Hermes, or a Philosophical Inquiry concerning Universal Grammar (1751). He was latterly a member of parliament, and held important government offices. In 1775 he published Philosophical Arrangements, a work on Aristotle's logic. His concluding work, Philological Inquiries, was completed in 1780, but was not published till after his death.

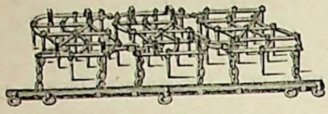
Harrisburg, a city of the United States, capital of Pennsylvania, 110 miles north of Washington, on the Susquehanna, over which there are three railway bridges besides a bridge for ordinary traffic. It occupies an elevated and commanding site, and has important industries connected with iron and steel and goods manufactured from them, various other industries, and an active trade. Pop. 39,385.

Harrison, John, English mechanician, was born in Yorkshire in 1693 and died 1776, was the son of a carpenter, and became an assistant to his father, who was occasionally employed in repairing clocks. An act of parliament had been passed in 1714 offering rewards of £10,000, £15,000, or £20,000 for a method of ascertaining longitude within 60, 40, or 30 miles. This Harrison set himself to accomplish, but it was not till 1765 that he was fully successful, the highest award being then allotted him for the invention of his chronometer. He also applied the principle of the different expansibility of metals in his gridiron pendulum, and invented a fusee by which a watch can be wound up without interrupting its movements.

Har'rogate, a town of England, county of York (West Riding), noted for its magnesia, sulphur, and chalybeate springs. The waters are especially recommended for patients with deranged digestive organs, chronic gout, and some cutaneous diseases. The sulphureous springs possess laxative and diuretic properties. The chalybeate are tonic. The bathing season lasts from May to September, and the number of annual visitors is about 40,000. Pop. (1891), 13,917.

Harrow, an agricultural implement, employed for smoothing land which has been ploughed. It consists of a frame of wood-

work, or of iron, in which are fixed rows of iron teeth. There are several varieties of this implement, such as the 'brake' for



Set of Iron Harrows.

breaking down rough land; the 'drill harrow' for pulverizing between furrows of green crops, the 'grubber' for pulverizing land before the deposition of seed.

Harrow-on-the-Hill (or simply HARROW), a town of England, county of Middlesex, on a hill of peculiar form. The grammar-school of Harrow, the rival of Eton, was founded in 1571 for the education of the poor children of the parish, certain fees being charged for strangers; but it is now almost entirely a school for the wealthy. The education originally given was exclusively classical, but mathematics, science, English history and literature, music, and drawing are now included among the subjects taught. Pop. 5725.

Harry (or HENRY) **the Minstrel**, commonly called *Blind Harry*, a wandering Scottish poet of the 15th century, to whom is attributed a poetical narrative of the achievements of Sir William Wallace. Its date may probably be placed between 1470 and 1480. It professes to be based on a history written in Latin by John Blair and Thomas Gray, which is now lost. It is often inaccurate, and has ceased to be much read.

Hart, a stag of five years of age. See *Stag*.

Harte, FRANCIS BRET, American novelist and poet, born at Albany, N. Y., 1839. He went to California in 1854, and figured as a coal-dealer, a teacher, and a type-setter on the Golden Era, in which appeared some of his earliest literary efforts. He next became editor of the Californian, and in 1864 secretary to the U. S. Mint at San Francisco. In 1868 he became editor of the Overland Monthly, in which appeared, in 1869, the humorous poem of The Heathen Chinee. In 1878 he became U. S. consul at Crefeld, whence he was transferred to Glasgow in 1880, and remained there until 1885. Among his best-known works are The Luck of Roaring Camp; The Outcasts of Poker Flat; The Argonauts of '49; Two Men of Sandy Bar; Gabriel Conroy; Mrs. Skagg's Husbands; In the Carquinez Woods; Maruja; Crusade of the Excelsior; A Waif of the Plains; Clarence; &c.

Hartebeest, or CAAMA (här'tė-bāst, kä'mȧ; *Alcelăphus Caama*), a S. African antelope, which measures about 5 feet high at the shoulders, has a long head, horns projecting outwards and backwards, black marks on the face and legs, a white mark on the rump, and a bushy tail. It is generally to be found in small herds.

Hartford, a city of America, the capital of Connecticut, on the Connecticut River, 50 miles above its mouth. It is pleasantly situated, is built with great regularity, and has among its edifices the state-house (built at a cost of 2½ million dollars), city-hall, deaf and dumb and lunatic asylums, Trinity College (Episcopal), R. C. Cathedral, the Wadsworth Athenæum, &c. Both manufactures and trade are of large extent, the former embracing carpets, linen, silk, edge-tools, &c., and it is the seat of the Colt Firearms Co. It is a great centre of the insurance business. The American asylum for the education and instruction of the deaf and dumb at Hartford was started in 1817. Hartford was settled in 1635 by an English colony from Massachusetts. Pop. 53,230.

Hartington, RIGHT HON. SPENCER COMPTON CAVENDISH, MARQUIS OF, born 1833, eldest surviving son of the seventh Duke of Devonshire. He was educated at Trinity College, Cambridge, of which he is B.A. and LL.D. He was attached, in 1856, to Earl Granville's Russian mission, and in 1857 was elected one of the members for North Lancashire. In 1863 he became a lord of the admiralty, and was war secretary from 1863 to 1866. In 1868 he lost his seat for North Lancashire, but became postmaster-general under Mr. Gladstone, and was returned for the Radnor burghs. In 1871 he was appointed chief secretary for Ireland. He went out with the Gladstone ministry in 1874, and soon after he became the leader of the Liberal party. On the fall of the Conservative government in 1880 he became secretary for India under Mr. Gladstone, and was transferred to the war office in 1882. He strenuously opposed Mr. Gladstone's Home Rule scheme of 1886, and became the leader of the Liberal-Unionist party. In 1891 he succeeded to the dukedom. In 1895 he joined the cabinet of Lord Salisbury as president of the council.

Hartlepool, a parliamentary borough of England, including the municipal borough

of Hartlepool and the town of West Hartlepool, in the county of Durham, 17 miles S.E. of the city of that name. The trade and industries of the towns are much of the same character; they possess iron-works, puddling furnaces, brass-foundries, engine and boiler works, ship-yards, saw-mills, breweries, &c. Extensive fisheries are also carried on. The two towns may be said to form one port. There are spacious docks and a fine pier, serving as a breakwater. Pop. of municipal borough of Hartlepool (1891), 21,521; of West Hartlepool, 42,492. The parliamentary borough, officially described as 'The Hartlepools,' and sending one member to parliament, has a pop. of 64,914.

Hartley, DAVID, an English physician, principally celebrated as a writer on metaphysics and morals, born 1705, died 1757. He became a fellow of Jesus College, Cambridge, and finally practised medicine at Newark, Bury St. Edmund's, and in London, and ended his days at Bath. In his Observations on Man (1749, two vols.) he formulates his hypothesis of nervous vibration and of the association of ideas.

Hartmann von der Aue, German poet, born about 1170, died about 1220. He wrote poetical tales, among which are Erec, Iwein, both belonging to the Arthurian cycle of legends, and Der Arme Heinrich, founded on by Longfellow in his Golden Legend.

Hartshorn, in pharmacy, the horn of the common stag, from which substances deemed of high medical value were formerly prepared by distillation, such as spirits of hartshorn, oil of hartshorn, and salt of hartshorn. The active ingredient of these was ammonia, which is now obtained from gas-liquor and other sources.

Hart's-tongue (*Scolopendrium*), a genus of highly ornamental ferns. Their fronds are simple and undivided. There are about a dozen species known, the *S. vulgāre* being British.

Hartz. See *Harz.*

Harun al Rashid (hä-rön' äl-ra-shēd'), a celebrated caliph of the Saracens, 786–809. (See *Caliph.*) The popular fame of this caliph is evinced by the Arabian Nights' Entertainments, in which Harun, his wife Zobeide, his vizier Giaffer, and his chief eunuch Mesrur are conspicuous characters.

Haruspices. See *Aruspices.*

Harvard University, the oldest university in the United States, situated in Cambridge, Massachusetts. The nucleus of it was formed in 1636 by the voting of a sum of £400 by the general court of Massachusetts. In 1638 the Rev. John Harvard bequeathed half of his property and his entire library to the projected institution. The college was immediately opened and received the name of its benefactor. The first graduation occurred in 1642. Its endowments have greatly increased since that time, and its property and funds now amount to $12,000,000. The principal college buildings number twenty-five, and include several halls, such as University Hall, Harvard Hall, &c. The libraries contain about 450,000 volumes. There are about 80 professors, exclusive of assistants, and the number of students is over 3000. An entrance examination is required in one of two sets of subjects, of which classics predominate in the one, mathematics and science in the other. After the first year's course, which embraces a prescribed series of studies, the student has a large number of different courses to select from in order to qualify for the degree of Bachelor of Arts, the course of study extending to four years. Among the departments connected with the university are: 1. The Law School; 2. The Lawrence Scientific School; 3. The Divinity School; 4. The Medical School; 5. The Dental School; 6. The Bussey Institution of Agriculture; 7. The Veterinary School. We may also mention the Museum of Comparative Zoology (the Agassiz Museum), the Botanical Garden, the Peabody Museum of American Archæology and Ethnology, and the Radcliffe College for women.

Harvest-bug (*Leptus autumnālis*), a small larval insect of the family Acaridæ or mites. It is of a bright red colour, so small as scarcely to be visible, and resembles a grain of cayenne pepper. It appears in June or July, and attacks the skin of domestic animals, as horses, dogs, sheep, &c., under which it burrows, causing a red pustule to arise. Its attacks are also very annoying to human beings, of whom it attacks the legs, thighs, and lower part of the abdomen.

Harvest-fly, a name given in the United States to a species of cicada, which appears as a winged insect in the harvest season.

Harvest-moon, a name which denotes a peculiarity in the apparent motion of the full moon, by which in Britain and high latitudes generally it rises about the same time in the harvest season (or about the autumnal equinox in September) for several successive

evenings. In southern latitudes this phenomenon occurs in March. It is owing to the fact that the moon is then travelling in that part of her orbit at which it makes the least possible angle with the ecliptic.

Harvest-mouse (*Mus messorius*), the smallest British quadruped, first made known to science by White of Selborne. It builds a globular nest usually suspended among stalks of wheat, &c.

Harvest-spider (*Phalangium longipes*), a British spider abounding in autumn, and possessing legs of unusual length. When irritated it has the peculiar property of throwing off one or more of its legs.

Harvey, Sir George, an eminent Scottish painter, born 1806, died 1876. He was a native of St. Ninians, near Stirling, and in his eighteenth year entered the Trustees' Academy, Edinburgh. In 1826 he became an Associate of the Royal Scottish Academy, and in 1829 an Academician. He was highly successful in depicting scenes connected with the religious history of Scotland, such as The Covenanters Preaching, The Battle of Drumclog, Quitting the Manse, &c. He also excelled in depicting mountain scenery. In 1864 he was elected president of the Royal Scottish Academy, and he was knighted in 1867.

Harvey, William, an English physician, the discoverer of the true theory of the circulation of the blood, was born at Folkestone 1578, died 1657. He entered Caius



William Harvey.

College, Cambridge, in 1593, and about 1599 proceeded to Padua, then the most celebrated school of medicine in Europe, and attended lectures on anatomy, surgery, and other branches of medical science. He took the degree of M.D., and returned to England in 1602. He settled in London, was admitted Fellow of the College of Physicians, elected physician of St. Bartholomew's Hospital, and in 1615 was chosen Lumleian lecturer. His views on the circulation of the blood were formally given to the world in his Exercitatio Anatomica de Motu Cordis et Sanguinis in Animalibus (On the Movement of the Heart and Blood in Animals), published at Amsterdam in 1628, in which he claims to have expounded and demonstrated them for upwards of nine years. Harvey's theory was attacked by several foreign physicians; but from the commencement his views were widely received. In 1623 he was appointed physician extraordinary to James I., and in 1632 he became physician in ordinary to Charles I. He was present at the battle of Edgehill, and afterwards accompanied Charles to Oxford. Here he received the degree of M.D., and was elected Master of Merton College, an office which he lost on the surrender of Oxford to the parliament. He returned to London in 1646, and spent the remainder of his life in retirement. Of Harvey's works, the next in importance to the De Motu is his Exercitationes de Generatione Animalium (On the Generation of Animals; 1651).

Harwich (har'ich), a seaport of England, county Essex, 66 m. E.N.E. London. The harbour is spacious, and has been much improved by the construction of two breakwaters. Steam packets ply regularly to continental ports. Ship-building and other maritime employments are carried on, and cement is dredged up outside the harbour. Harwich is much frequented by sea-bathers. Pop. 8191.

Harz, or Hartz (hárts), the *Hercynia Silva* of the Romans, the most northerly mountain chain of Germany, from which an extensive plain stretches to the North Sea and the Baltic. It extends from south-east to north-west, and comprises an extent of about 60 miles in length and nearly 20 in breadth, embracing the towns of Klausthal, Goslar, Blankenburg, Wernigerode, &c. The Brocken, its highest summit, is 3742 feet high. (See *Brocken.*) That part of the Harz which includes the Brocken, with the neighbouring high summits, is called the Upper Harz, and consists entirely of granite. The south-east portion is called the Lower Harz. The Harz abounds in woods and fine pastures; and is rich in minerals, in-

cluding silver, iron, lead, copper, zinc, arsenic, manganese, granite, porphyry, slate, marble, alabaster, &c.

Has'drubal (more correctly *Asdrubal*, 'Baal is his help'), the name of several Carthaginian leaders, particularly the brother of Hannibal, the hero of the Second Punic war. On the departure of Hannibal for Italy, B.C. 218, he was left in command of the army in Spain, in which capacity he carried on a long series of military operations against the Roman troops, which were commanded by Cnæus and Publius Scipio. His brother Hannibal requiring his assistance in Italy, Hasdrubal led an army from Spain into that country (B.C. 207), but before he could join forces with his brother he was defeated on the right bank of the Metaurus by C. Nero and M. Livius. Nero is said to have thrown Hasdrubal's head into Hannibal's camp, by way of announcing the defeat and death of his brother.

Hash'ish, an intoxicating preparation made in Eastern countries from common hemp (*Cannăbis satīva*), or rather from the Indian variety of it (*Cannabis indica*); also a name for this plant itself or for its tender shoots. The juice of the plant has powerful narcotic properties, and is variously made use of. A resin which the plant gives out is often gathered and kneaded and formed into small balls called *churrus*, and from this a narcotic is prepared. It has the appearance of a tenacious ointment of a greenish-yellow colour, with an acrid savour and a nauseous smell. Hashish produces a kind of intoxication, accompanied with ecstasies and hallucinations. When dried and smoked as tobacco the plant is called *bhang;* or this name is given to a drink prepared from the leaves and shoots. *Ganja* or *Gunja* is the dried shoots of the female plant with the resin on them. Hashish in several forms is employed in medicine.

Haslar Hospital. See *Gosport*.

Haslingden, a mun. bor., England, county of Lancaster, 16 miles north of Manchester, with manufactures of cottons, woollens, &c. Pop. 18,225.

Hasselt, a town, Belgium, capital of Limburg, on the Demer, with manufactures of tobacco, lace, linen; distilleries, &c. Pop. 13,318.

Hastings (hās'tingz), a parl. and mun. borough and market town of England, county of Sussex, one of the Cinque Ports, pleasantly situated on the sea-coast, and including the suburb of St. Leonards-on-Sea. In front of the town is an esplanade, a fine pier 900 feet long, and baths said to contain the largest tepid swimming-bath in the world. There is no harbour. Fishing and boat-building are carried on, but the principal support of the town is derived from the numerous visitors who frequent it during the bathing and winter seasons. There are here the ruins of an ancient castle, and of the church and conventual buildings of a college, supposed to have been founded in the reign of Henry I. William of Normandy defeated Harold near here, 14th October, 1066. Hastings returns one member to parliament. Pop. of parliamentary and municipal borough respectively, in 1891, 60,878 and 52,340.

Hastings, Francis Rawdon, Marquis of, Governor-general of India, born 1754, died 1825. Having studied at Oxford, he entered (1771) the 15th Foot. From 1776 to 1782 he served with distinction in the American war. In 1793 he became Earl of Moira, and in 1795 commanded the expedition to Quiberon. From 1813 to 1823 he was Governor-general of India, and was successful in the Nepaulese and Mahratta wars. In his latter years he was governor of Malta.

Hastings, Warren, first Governor-general of India, was born at Daylesford in Worcestershire 1732, and died there 1818. He was

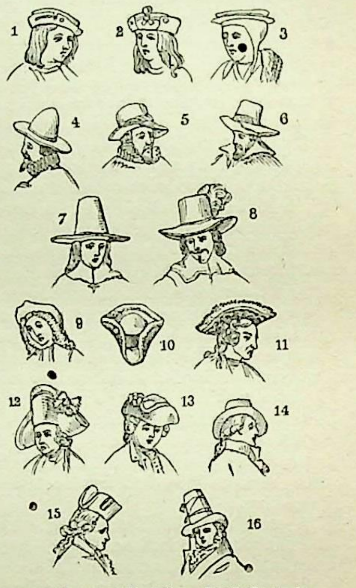


Warren Hastings.

grandson of the rector of Daylesford. He was educated at Westminster School, and in 1750 he set out for Bengal in the capacity of a writer in the service of the East India Company. When stationed at Cos-

simbazar he was taken prisoner by Surajah Dowlah on the capture of the place (1756). Having made his escape, he served as a volunteer under Clive in 1757. He was representative of the Company at Moorshedabad from 1758 to 1761. In the latter year he removed to Calcutta, having obtained a seat in the Bengal Council, but returned to England in 1764. As he lost the bulk of his means by unfortunate Indian investments, he again entered the Company's service, and sailed for India in 1769. In consequence of the misgovernment of the Nabob of Bengal the Company had deprived him of all real power, and now wished to have the country more directly under their control. Warren Hastings was its chief instrument in this undertaking, and in 1772 became president of the Supreme Council of Calcutta. Mohammed Reza Khan, the administrator of the revenues of Bengal, was now accused by an unprincipled character named Nuncomar of corruption and abuses of power. In this prosecution Hastings acted as the tool of the Company. Mohammed and Shitab Roy, dewan of Behar (who had been similarly accused), were afterwards honourably acquitted, but meantime the reorganization desired by the Company had been carried out. In 1773 the Company's powers were considerably modified by an act of parliament and Hastings now received the title of Governor-general of India. As the majority of the Council disapproved of Hastings' past policy, Nuncomar, his old ally, took advantage of the circumstance to accuse him of peculation (1776). The accusations were favourably received by the Council, when Nuncomar was suddenly accused by a Calcutta merchant of forgery, was tried, and executed —a fate which he undoubtedly deserved. In 1776 the directors of the Company petitioned government for his removal from the Council, but Hastings resigned, and a successor to him was appointed. In 1777 one of the members of the Council died, and Hastings, having thus procured a casting vote, withdrew his resignation, and returned to office. He now displayed extraordinary resource in meeting dangerous movements on the part of the Mahrattas, the Nizam of the Deccan, and Hyder Ali of Mysore, and to procure the needful money was less than scrupulous in his treatment of the rulers of Benares and Oude. He thus gave good grounds for censure, and a motion for his recall was passed in the House of Commons. Fox's India Bill was thrown out in 1783, but next year Pitt's bill, establishing the board of control, passed, and Hastings resigned. He left India in 1785, and was impeached by Burke in 1786, being charged with acts of injustice and oppression, with maladministration, receiving of bribes, &c. This celebrated trial, in which Burke, Fox, and Sheridan thundered against him, began in 1788, and terminated in 1795 with his acquittal, but cost him his fortune. The Company in 1796 settled on him an annuity of £4000 a year, and lent him £50,000 for eighteen years free of interest. He passed the remainder of his life in retirement at Daylesford, which he purchased.

Hat, an outdoor covering for the head of various shapes and materials (as felt, silk, wool, straw), but having a *brim* as its most



Forms of Hats in 16th, 17th, and 18th Centuries.

1, 2, time of Henry VIII. 3, time of Mary. 4, time of Elizabeth. 5, 6, time of James and Charles I. 7, 8, time of Commonwealth. 9, 10, time of William III. 11–16, Eighteenth Century.

distinctive and general feature. Hats are of ancient origin. Among the Greeks, for instance, the *petasos* was worn, which had a brim, and was similar to the round felt now worn. The shape of the hat has varied extremely in Europe at different

periods. The *dress hat* or *silk hat* with a smooth nap outside is the most important form of this article at present, though felt hats are perhaps in more general wear. (See *Felt*.) The silk hat was invented at Florence about 1760. The manufacture, however, did not make much progress till 1828. Up to and even after this time beaver fur was the chief material for hats. A silk hat is composed of a skeleton, to which the silk plush is glued. The skeleton, consisting of three parts, the cylindrical part or body, the crown, and the brim, is usually made of linen, covered with gum-lac, and to the cylindrical part the crown is gummed. The cylindrical part is made by gumming together the edges of a piece of cloth shaped on a cylinder. The brim is composed of superposed layers of stiffer cloth, and made with a flat projecting surface round its inner edge, which is gummed to the skeleton. For covering the hat a sort of hood of silk plush is made, cut across in an oblique line. This cover is drawn over the skeleton on the block, and fitted exactly to it by the application of a hot iron. The heat of the iron melts the gum-lac, which on cooling cements the covering to the skeleton. The edges of the oblique cut are also coated with gum-lac. The hat is finally shaped on the block or form, and the plush damped and polished, while the hat revolves on a turning-lathe. In the manufacture of straw hats the straw commonly used is that of wheat or barley. The best comes from Italy, and particularly from Tuscany, but straw hats are also largely made in England. Palm-leaf hats are imported from China and Manilla, and are also machine-made in the United States.

Hatching, natural and artificial. See *Incubation*.

Hatchment (corrupted from *achievement*), in heraldry, the coat of arms of a person dead, usually placed on the front of a house, in a church, or on a hearse at funerals, by which the fact of the death and the rank of the deceased may be known; the whole being distinguished in such a manner as to indicate whether the person was a bachelor, a married man, a wife, &c.

Hatchway, a square or oblong opening in the deck of a ship, affording a passage from one deck to another, or into the hold. The *after-hatchway* is placed near the stern, the *fore-hatchway* towards the bows, the *main-hatchway* is placed near the main-mast.

Hat'field, a town of England, in the county of Hertford. Near it is Hatfield House, built by Sir Robert Cecil, the residence of the Marquis of Salisbury. Pop. 4330.

Hathor. See *Athor*.

Háthras, a town of India, North-west Provinces, Aligarh District, formerly one of the strongest fortresses in India, now a great commercial centre. Pop. 39,181.

Hatteras, Cape. See *Cape Hatteras*.

Hatti-sheriff, the Turkish name of an edict signed by the sultan, who subscribes it usually with these words:—'Let my order be executed according to its form and import.' These words are usually edged with gold, or otherwise ornamented. An order given in this way is irrevocable.

Hatto, the name of two archbishops of Mainz, of which the second, who died in 969 or 970, is the best known. He was Abbot of Fulda until 968, when he was appointed Archbishop of Mainz. Of his subsequent life very opposite accounts exist; some represent him as an upright prelate and reformer of abuses; others in the blackest colours. The legend of his being devoured by rats, and which Southey has popularized, is well known.

Hatton, Sir Christopher, Lord-chancellor of England, a favourite of Queen Elizabeth, born about 1540, died 1591. He was introduced at court in 1564. He was elected a member of parliament in 1571, became captain of the queen's guard in 1572, vice-chamberlain and a privy-councillor in 1577, lord-chancellor in 1587. He was one of the commissioners for the trial of Mary, queen of Scots, in 1586.

Hatzfeld (háts'felt), a town of the Austrian Empire, in Hungary, district of Torontal. Pop. 8621.

Hauberk, a kind of coat of mail, comprising the small and the large hauberk, the former consisting of a jacket in scales descending to the hips, with loose sleeves not reaching to the elbow; the latter with a *camail* or hood, reached to the knee, the sleeves extending a little below the elbow.

Hauff (houf), Wilhelm, German novelist and writer of humorous and fantastic stories, born 1802, died 1827. His first publication was his Almanach of Tales for the Year 1826, which was followed by similar collections for the next two years, the whole forming a collection that has been highly popular. Extracts from the Memoirs of Satan appeared in 1827, but remained uncompleted. Lichtenstein, a novel written

under the inspiration of Sir Walter Scott, appeared in 1826, and is one of the best German novels of its class. In 1827 was issued The Man in the Moon, and the same year Fantasies in the Wine Cellar of Bremen Council, a piece of excellent humour. Among the best of his works are two novelettes, The Picture of the Emperor and The Beggar-woman of the Pont-des-Arts.

Hauran, a district in Syria, east of the Jordan and south of Damascus. It contains the ruins of many ancient towns, with numerous Greek inscriptions. In the Roman period it was one of the four provinces of Bashan. It is fertile but thinly inhabited. A railway reaches it from Damascus.

Haussa. See *Houssa.*

Haustella'ta, a very extensive division of insects, in which the mouth is furnished with a haustellum or proboscis adapted for suction. It includes the butterflies and moths, two-winged flies, &c., these insects being contrasted with the Mandibulata, which have jaws acting as cutting organs.

Hautboy (ō'boi). See *Oboe.*

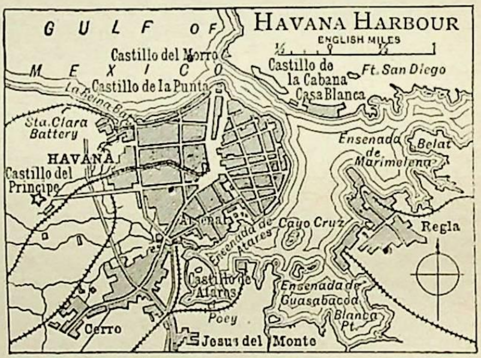
Hautelisse Tapestry (ōt'lis), a kind of tapestry wrought with a perpendicular warp, as distinguished from *Basselisse.*

Hautes-Alpes. See *Alpes.*

Hautes-Pyrénées. See *Pyrénées.*

Haüy (ä-ü-ē), René Just, a French mineralogist, born 1743, died 1822. He studied theology, became an abbé, and during twenty-one years occupied the place of a professor, at first in the college of Navarre, and afterwards in that of the Cardinal Le Moine. He studied botany, and subsequently mineralogy, and introduced a once celebrated system of crystallography. On the outbreak of the revolution Haüy was imprisoned for refusing to subscribe to the new constitution, but his life was saved by the exertions of Geoffroi de St. Hilaire. In 1793 he was appointed a member of the Commission of Measures and Weights, in 1794 conservator of the Cabinet des Mines, and in 1795 teacher of physics in the École Normale. In 1802 Napoleon made him professor of mineralogy in the Musée d'Histoire Naturelle, and also shortly after in the Faculté des Sciences. Haüy was remarkable for the extreme modesty of his disposition. His principal writings are his Essai sur la Théorie et la Structure des Cristaux (1784), his Traité de Minéralogie (1802), his Traité élémentaire de Physique (1803), and his Traité de Cristallographie (second edition, 1822), &c.—His brother Valentin, born 1745, died 1822, started the first institution for the instruction of the blind. See *Blind (The).*

Havan'a (Spanish, *La Habana*, 'the haven'), an important maritime city, capital of Cuba, on the north-west side of the island, with an extensive and excellent natural harbour. The town in the older parts has narrow, badly-paved streets, but there are also wide and handsome promenades and avenues. The houses, which are low and with flat roofs, resemble those of Southern Spain. Havana is the see of a bishop, and the seat of the governor. The cathedral contains the ashes of Columbus, which were brought hither from San Domingo in 1796. Among the other buildings are the governor's house, the admiralty, the university, the exchange, the opera-house, &c. The staple manufacture is that of its celebrated cigars. The other manufactures, consisting chiefly of chocolate, straw-hats, and woollen fabrics, are not of much consequence. The trade is extensive, the most important articles of export being sugar and tobacco, unmanufactured or in the form of cigars and cigarettes; other exports are molasses, coffee, wax, honey, rum. The United States have the principal share of the trade, and Spain and England rank next.



Several railways start from Havana. The town was founded in 1511, but was only fairly begun in 1519. For a long time Spain derived the chief part of her fleet from the building-yards of Havana. Pop. estimated at 230,000.

Hav'el, a navigable river of Germany, which rises in Mecklenburg-Schwerin, enters Prussia, flows past Spandau, where it receives the Spree, and joins the Elbe, after a course of 160 miles.

Havelberg, a town in Prussia, province of Brandenburg, on the Havel, engaged in brewing, sugar-refining, and ship-building. Pop. 6936.

Havelock (hav'lok), SIR HENRY, K.C.B., major-general in the British army, was born at Bishop-Wearmouth, near Sunderland, on 5th April, 1795. Having entered the army, he served with distinction in the Burmese war (1824–26). In 1829 he married a



Sir Henry Havelock

daughter of Marshman, the celebrated missionary, became a Baptist, and was distinguished during the remainder of his life by his earnest religious zeal. He attained his captaincy in 1838, participated in the Afghan war, was present at the storming of Ghazni and the capture of Cabul, and in Sale's march to Jelalabad, and assisted in the defence of that city, and in the defeat of Mohammed Akbar, 1843. He was made a Companion of the Bath, and brevet-major, took part in the Mahratta war, and distinguished himself in the Sikh war of 1845, being present at Mudki, Ferozeshah, and Sobraon. In 1851 he was promoted to the adjutant-generalship of the queen's forces in India, and he commanded a division in the Persian war (1856–57). On the outbreak of the Indian mutiny he was despatched to Allahabad in order to support Sir H. Lawrence at Lucknow and Sir H. Wheeler at Cawnpore. On his march to Cawnpore he defeated the rebels at Fattihpur, Aong, Pandunadi, and Maharajpur. On arriving at Cawnpore he found that Nana Sahib had massacred the prisoners. Pursuing his march to Lucknow, he defeated the rebels at Bithoor, and finally, with the aid of Outram, won the battle of Alumbagh. Having captured Lucknow, Havelock and Outram were shut up there until relieved by Sir Colin Campbell, 17th Nov. 1857. He died of dysentery at Dilkusha on the 24th. He was raised to the rank of major-general, made a K.C.B., and (before his death was known) created a baronet.

Haverfordwest, a town of Wales, county town of Pembroke, and one of the Pembroke district of parliamentary boroughs, on the West Cleddaw River. It manufactures paper, and has a small shipping trade. Pop. (mun. bor.) 6179. See *Pembroke*.

Hav'erhill, a town of the U. States, in Massachusetts, on the Merrimac, with extensive manufactures of boots and shoes. Pop. (1890), 27,412.

Hav'ersack, a bag of strong cloth with a strap fitting over the shoulder, worn by soldiers in marching order, for carrying their provisions.

Haver'sian Canals, a net-work of minute canals, which traverse the solid substance of bones, and proceed from the central cavity, conveying the nutrient vessels to all parts.

Havildar', the highest non-commissioned officer in the native armies of India, in rank equivalent to a sergeant. Also a police official in villages.

Havre (ä-vr), LE (formerly *Le Havre-de-Grâce*), a seaport of Northern France, dep. Seine-Inférieure, on the north side of the estuary of the Seine, 108 miles north-west of Paris, built of brick or stone in straight, wide streets. The public buildings possess little interest. The manufactures include chemicals, machinery, cotton goods, earthen and stone ware, paper, glass, oil, refined sugar, ropes, &c. A government tobacco factory employs 300 workmen; and a great number of vessels are built. But the chief dependence of Havre is on its commerce, which is the greatest of any French port next to Marseilles. It has a large trade with England and Germany, and especially with America, importing great quantities of cotton and other produce; and exporting numerous articles of French manufacture.

The importance of Havre dates from the early part of the 16th century. Pop. 116,369.

Hawaii (hä-wī'ē). See *Sandwich Islands.*

Hawarden (hạr'den), a town in Flintshire, Wales, lying in a coal district, and having valuable clay beds in the vicinity. In the neighbourhood is Hawarden Castle, the residence for years of the late W. E. Gladstone. Pop. 7057.

Hawes, STEPHEN, an English poet, who lived in the end of the 15th and beginning of the 16th century. The exact date of his birth and death is unknown. His principal work is The Historie of Graunde Amour and la Bell Pucell, or The Pastime of Pleasure.

Hawfinch (*Cocothraustes vulgāris*), a species of grossbeak, so called from the belief that it subsisted principally on the fruit of the hawthorn. It is one of the largest of the finches. It resembles the chaffinch in colour, but is distinguished from it by its enormous beak, larger size, and bill-hook formation of some of its wing-feathers. It feeds on all kinds of berries. It is found in some parts of Britain.

Hawick (hạ'ik), a parliamentary burgh of Scotland, in Roxburghshire, on the Teviot, 50 miles S.W. from Edinburgh. The staple industries of the town are the manufacture of hosiery and tweeds, but tanning, skin dressing, oil making, dyeing, and iron-founding, are also carried on. Hawick is one of the Border Burghs which together return one member. Pop. (1891), 19,204.

Hawk, a name often applied to all birds of prey except the eagles, vultures, and owls. It thus includes the falcons as well as the hawks proper, the latter being distinguished from the former chiefly by their shorter wings, which do not reach the extremity of the tail, and have the fourth quill longest and the first short; their beaks also are less robust, and want the tooth-like notch of the former. Of the hawks proper the chief British species are the goshawk and the sparrow-hawk (which see; and see also *Falcon*).

Hawke, EDWARD, LORD, a celebrated naval commander, born in 1705, died 1781. He entered the navy as a midshipman, in 1734 received the command of the *Wolf*, and in 1747 he became commander of a squadron, and defeated the French fleet at Belleisle. Hawke was in consequence made a K.C.B., and vice-admiral of the blue. In 1759 he defeated the French at Quiberon. Hawke was, in 1765, appointed vice-admiral of Britain, and was elevated to the peerage in 1776.

Hawker, REV. ROBERT STEPHEN, English poet and divine, was born in 1805, and died in 1875. He was educated at Oxford and became vicar of Morwenstow, Cornwall. His works comprise Ecclesia, Cornish Ballads; Echoes from Old Cornwall; The Quest of the Sangreal; Footprints of Former Men in Cornwall, &c.

Hawkers. See *Pedlars and Hawkers.*

Hawke's Bay, a district of New Zealand, on the east coast of North Island; area, 3,050,000 acres, containing much fertile soil, well adapted for agricultural and pastoral purposes. The capital is Napier. Pop. 28,506.

Hawkesbury, a river in New South Wales, flowing into the Pacific near Sydney, and remarkable for its inundations.

Hawking. See *Falconry.*

Hawkins, SIR JOHN, English sea commander, born at Plymouth 1520, died 1595. He made several voyages in his youth, and in 1562 and 1564 he went on expeditions to Africa in order to procure negroes for the West Indies. A third expedition, in 1567, was disastrous, as his fleet was defeated by the Spaniards. In 1573 he became treasurer of the navy. In 1588 he was appointed vice-admiral in the expedition against the Armada, and received a knighthood for his services. In 1590 he and Frobisher unsuccessfully attempted to intercept the Spanish plate fleet, and in 1595 he and Drake led an unsuccessful expedition against the Spaniards in the West Indies, in the midst of which Hawkins died.



Privet Hawk-moth (*Sphinx ligustri*).

Hawk-moth, one of the sphinx moths, so called from its hovering motion, which resembles that of a hawk looking for its prey. The death's-head hawk-moth is the *Acherontia atrŏpos;* the privet hawk-moth, the *Sphinx ligustri;* the humming-bird hawk-moth, the *Macroglossa stellatarum.*

Hawkweed (*Hieracium*), a genus of composite plants, sub-order Cichoraceæ, consisting of numerous species with yellow flowers, common weeds in Britain and other parts of Europe. The pappus is brown and brittle, and in many species the leaves, involucres, and stems are hairy. *H. Pilosella* is the

best known in Britain. Its brilliant yellow flower often appears in heaths and pastures.

Hawkwood, SIR JOHN, an English soldier of fortune, date of birth unknown, died 1394. On the invasion of France by Edward III. Hawkwood was knighted on account of his courage and ability. In 1360 he occupied a prominent place in the marauding companies which harassed France. He next took regular service under the Pisan Republic for twenty-three years, but in 1387 he entered that of the Florentines. He founded the English hospital at Rome, and died at Florence.

Hawse, that part of a vessel's bow where holes called the hawse-holes are cut for the cables going through; also, the hole cut in the vessel's bow.

Hawser, in ships, a small cable or a large rope, in size between a cable and a tow-line, used in warping, &c.

Hawthorn, or WHITETHORN (*Cratægus Oxyacantha*), a small spiny European tree, belonging to the sub-order Pomeæ of the order Rosaceæ, rising sometimes to the height of 20 to 25 feet. The leaves are alternate, obovate, 3 to 5 lobed; the flowers are white, sometimes with a reddish tinge, disposed in corymbs, and possess an agreeable perfume; the fruit is a drupe of a red colour, and is edible. The species are about fifty in number, all shrubs or small trees. A number of them belong to the United States. When young the hawthorn springs up rapidly, and if pruned grows into a thick hedge. When it arrives at the height of a tree, however, it makes wood very slowly. The timber is hard and durable, and fit for many purposes of utility. The double-flower kind is one of the most ornamental for shrubberies. Hawthorn blossom is often called *May*, from the time of its flowering in England.

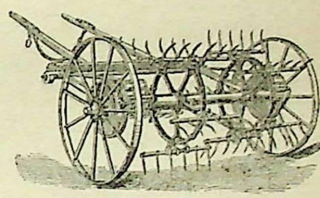
Hawthorne, NATHANIEL, American author of remarkable originality, born at Salem, Massachusetts, 1804, died 1864. He studied at Bowdoin College, where he took his degree in 1825 along with the poet Longfellow. For a number of years after this he led a retired and studious life in Salem, writing tales, some of which appeared in newspapers and magazines. In 1837 appeared his Twice-told Tales, a collection of stories which he had contributed to various American periodicals. In 1838 he was appointed a weigher in the Boston custom-house, a post which he held for a few years. In 1846 he published his Mosses from an Old Manse; in 1850 The Scarlet Letter; in 1851 The House of the Seven Gables; and in 1852 The Life of President Pierce, and the Blithedale Romance. In 1853 he became American consul at Liverpool, a post which he held until 1857. He died at Plymouth,



Nathaniel Hawthorne.

New Hampshire. Other works are his Transformation (1860), Our Old Home (1863), &c.—JULIAN, son of the above, born 1846, also a novelist. In addition to a biography of his father, he has written the novels of Bressant, Idolatry, Fortune's Fool, &c.

Hay, the stems and leaves of grasses and other plants cut for fodder, dried in the sun, and stored usually in stacks. The time most suitable for mowing grass intended for hay is that in which the saccharine



Hay-tedder.

matter is most abundant in the plants, viz. when the grass is in full flower. For the operation of mowing, dry weather, and, if possible, that in which sunshine prevails, is chosen. The making of the grass into hay generally takes three or four days to get it ready for stacking. This period is principally occupied in alternately *tedding* (*i.e.* shaking out the grass loosely) and gathering

it up into cocks or small heaps, previous to stacking. Care must be taken to avoid haymaking either under a scorching sun or during the prevalence of rain, and the cocks should never be opened in the morning until the disappearance of the dew. In stacking the great object is to preserve the freshness of the herbage, and to induce a slight degree of fermentation. If the weather has been wet a few layers of straw may be inserted at intervals. Salting is also recommended. On large farms the tedding is performed by a tedding or haymaking machine drawn by a horse.

Haydn (hī′dn), JOSEPH, a celebrated German musical composer, born at Rohrau, on the borders of Hungary and Austria, 1732, died 1809. At the age of six he was sent to school at Haimburg, where he learned, among other things, singing and playing by rote. On account of the excellence of his voice he was appointed a choir-boy at St. Stephen's Church, Vienna. At the age of sixteen his voice began to break, and he lost his situation as a chorister. Having made the acquaintance of Metastasio, Porpora, and Gluck, Haydn gradually attracted public attention, was appointed organist to two churches, and obtained many pupils. From 1761 to 1790 he was musical director to Prince Esterhazy, and composed during this period a great number of works, including some 120 symphonies for the orchestra, 12 operas, &c. In 1791 and 1794 he visited England, staying there nearly three years altogether, and writing his opera Orpheus and Eurydice. In 1798 he published his oratorio of the Creation, and in 1800 that of the Seasons. His old age was exempt from pecuniary troubles, and he was surrounded by appreciative friends. His last public appearance was at a performance of his Creation in 1808. Haydn's principal merit consists in his opening up a new development of instrumental composition, of which his 125 orchestral symphonies furnish abundant proof. He may be said to be the originator of the symphony and of the stringed quartette.

Hay′don, BENJAMIN ROBERT, an English historical painter, born in 1786, died by his own hand in 1846. In 1804 he became a student of the Royal Academy, and in 1807 exhibited his first work, Joseph and Mary Reposing (in Egypt), and his Dentatus in 1809. His Judgment of Solomon appeared in 1814. In 1815 he established a school in opposition to the Academy, an undertaking which ended in pecuniary failure in 1823. He was several times in prison for debt, was always complaining of injustice and neglect, and finally became deranged when he failed to be employed in decorating the new houses of parliament. He was the chief English historical painter of his time, and a man of great intellectual ability generally. But he was self-willed, perverse, and devoid of tact. Of his pictures the principal are—Christ's Entry into Jerusalem, the Raising of Lazarus, the Mock Election, Chairing the Member, Pharaoh Dismissing Moses, the Burning of Rome, the Banishment of Aristides, and Quintus Curtius Leaping into the Gulf. He left an interesting autobiography.

Hayes, ISAAC ISRAEL, American Arctic explorer, born 1832, died 1881. He was a member of the expedition of 1853–55 under Dr. Kane, and himself commanded an expedition in 1860–61. He served as an army doctor during the war, and in 1869 he visited Greenland. He wrote The Open Polar Sea, and The Land of Desolation.

Hayesine, or ULEXITE, a borate of calcium found in Nova Scotia, Peru, and in the lagoons of Tuscany, and utilized as a source of boracic acid, and for glass and pottery manufacture.

Hay-fever, or HAY-ASTHMA, a complaint caused by the odours of flowering grasses, of a stable, or of certain drugs, such as ipecacuanha. The disease varies from the symptoms of a severe cold up to those of spasmodic asthma. The patient is tormented with headaches, his eyes are suffused, he sneezes violently, and there is an acrid discharge from the nose, with harassing cough. Removal from the cause of the disease is beneficial, so are the smoking of tobacco, the inhalation of vapour of creosote, &c. Helmholtz has discovered vibriones in the mucus of patients afflicted with hay-fever.

Haymarket Theatre, one of the principal theatres of London. It was built in 1702, opened in 1720, made a theatre royal, and rebuilt in 1767, when it was under the management of Foote. In 1821 it was again rebuilt under Nash.

Haynau (hī′nou), JULIUS JAKOB, an Austrian general, born in 1786, died 1853. He took part in the battles of Austerlitz and Wagram, and was wounded in both. He also distinguished himself in the campaigns of 1813–15. In 1848 and 1849 he rendered valuable services to Austria against the

Italians, took Brescia by storm, and visited it with unrelenting severity. He was afterwards carrying on the siege of Venice, when recalled by the emperor to Hungary. The storming of Raab, the advance southwards in the face of almost insurmountable difficulties, the siege of Szegedin, the battle on the Theiss, followed by the capture of Temesvar, were all effected by Haynau. He incurred extreme odium, however, on account of his severities and arbitrary measures, and in 1850 he was deprived of his powers, and retired into private life.

Hayti, HAITI, or SAN DOMINGO (originally *Española;* Latin, *Hispaniola*), one of the West Indies, after Cuba the largest and one of the most fertile of these islands. It lies south-east from Cuba, and is separated from it by the Windward Passage, 50 miles broad. Its length is 400, and breadth 150 miles; area, about 28,000 sq. miles, or nearly as large as Scotland. It is of irregular form, and is intersected west to east by three chains of mountains, connected by offsets, with extensive plains and savannahs between. The central chain contains the highest peak, Loma Tina, 10,200 feet. The principal plain is the fertile Vega Real, between the northern and central ranges. The rivers are numerous, but of small size. The minerals include gold, silver, quicksilver, &c., but are greatly neglected. Hayti as a whole is one of the healthiest of the West Indian Islands. The seasons are: a wet, during which heavy rains are most frequent in May and June; and a dry, during which little or no rain falls. The flora includes pines, mahogany-trees, fustic, satin-wood, lignum-vitæ, and other cabinet and dye woods, plantains, bananas, yams, batatas, oranges, pine-apples, &c. The staple cultivated products are: coffee, sugar, indigo, cotton, tobacco, and cacao. The fauna includes the agouti, European cattle and pigs run wild, snakes, caymans, turtles, &c. Among the principal towns in Hayti are Port-au-Prince, San Domingo, Jacmel, and Cape Haytien.

Hayti was discovered by Columbus in 1492. It was then inhabited by perhaps 2,000,000 natives, but so ruthlessly did the Spaniards deal with the aborigines that within a century they practically exterminated them, having introduced negro slaves in their place. In 1630 the French settled in the western part of the island, and in 1697 the western portion was ceded to them, while the eastern remained Spanish. In 1791 the negroes revolted against France, and latterly the whole island came under the negro leader Toussaint L'Ouverture, who established an independent republic. He was captured, but in 1803 Dessalines headed a new insurrection, drove out the French, and was crowned emperor of Hayti. He was assassinated in 1806, and the Spaniards regained the eastern portion of the island. In 1821 the Spanish portion declared itself independent of the mother country, and assumed the name of Spanish Hayti; but it was subjugated by Boyer, the president of the Haytian Republic, or French Hayti. In 1844 the inhabitants of the Spanish portion rose, and formed themselves into a republic under the name of San Domingo (Republica Dominica). In 1861 Santana negotiated a reunion of the state with Spain, but Spain evacuated the island in 1865. From that period its history has presented an almost uninterrupted scene of revolution and bloodshed. It now comprises the Republic of Hayti on the west side of the island, and the Dominican Republic on the east. Port-au-Prince is the capital of Hayti, and the population of the republic is roughly estimated at 960,000, consisting of negroes and mulattoes. San Domingo is the capital of the Dominican Republic, and the population of the latter state is estimated at 500,000, consisting also of negroes and mulattoes, with a considerable admixture of whites. In Hayti French is the prevailing dialect; in the Dominican Republic, Spanish. The area of the former comprises 10,204 sq. miles; that of the latter, 18,045 sq. miles. The state of society in Hayti is represented as deplorable, cannibalism being said to be common.

Haz'ard, a game at dice played for money. The player is called the *caster*, and his opponent, who bets with him, is called the *setter*. The former calls a *main*, *i.e.* any number from 5 to 9 inclusive. He then throws with two dice, and wins if he 'nicks.' Five is a nick to 5; 6 and 12 are nicks to 6; 7 and 11 to 7, &c. The caster loses or 'throws out' if he throws aces, or deuce ace (called *crabs*). Hazard is a game involving nice calculations.

Hazaribagh (ha-zär-i-bäg'), chief town of the district of the same name, in Chota Nagpur, Bengal. Pop. 16,700. The district contains 7021 sq. miles. Pop. 1,164,321.

Hazebrouck (äz'bruk), a town of France, dep. Nord, having a fine church with an open spire 240 feet high. It has linen manufac-

tures, breweries, tanneries, dye-works, &c. Pop. 7121.

Hazel (*Corylus*), a genus of shrubs or small trees of the order Corylaceæ or Cupuliferæ. It belongs to Europe, North Africa, Asia, and North America. The leaves are roundish-cordate, alternate, and shortly petiolate. The European hazel (*C. Avellāna*) produces the nuts called filberts, and grows best in a tolerably dry soil. It bears male and female flowers, the former composing cylindrical catkins. The hazelnut oil is little inferior in flavour to that of almonds. Hazel branches form excellent walking-sticks, fishing-rods, &c., and the wood produces good charcoal, often employed by painters. The American hazel (*C. americāna*) very much resembles the European. The roots are used by cabinet-makers for veneering; and in Italy the chips are sometimes put into turbid wine for the purpose of fining it.

Hazel-grouse (*Bonāsa betulīna*), a species of grouse inhabiting the continent of Europe and great part of Asia, allied to the ruffed grouse of America.

Ha'zeline, an alcoholic liquid distilled from the fresh leaves of the *Hamamēlis virginica*, the witch-hazel, native to the United States. It is exceedingly useful as an application to wounds, stanching the bleeding and promoting healing. It is equally useful for bruises, inflammatory swellings, sprains, and the like. It is applied on a pledget of lint to bleeding piles. In internal bleeding, whether from the lungs, stomach, or bowels, it gives very satisfactory results. There are several officinal preparations of the witch-hazel, a fluid extract and a tincture, the dose of the former being 15 to 60 drops, and of the latter 2 to 5. Hazeline is the name given to a clear colourless liquid prepared by certain chemists, but not officinal, of which a tea-spoonful may be given. The American patent medicine, Pond's Extract, is the same.

Hazlitt, William, English critic and essayist, son of a Unitarian minister, was born 1778; died 1830. In 1793 he became a student in the Unitarian College, Hackney, but on leaving it devoted his time to portrait painting. This was in its turn renounced for literature, his first publication being an essay On the Principles of Human Action, 1805. He delivered various series of lectures, and contributed to the Edinburgh Review, &c. Among his chief works are: Characters of Shakspere's Plays, A View of the English Stage, Lectures on the English Poets, Lectures on the English Comic Writers, Table Talk, Lectures on the Elizabethan Age, Life of Napoleon Bonaparte, and essays, written in conjunction with Leigh Hunt, published under the title of the Round Table.—William Carew, grandson of the above, is an industrious author and editor, among his publications being History of the Venetian Republic; Remains of the Early Popular Party of England; Memoirs of William Hazlitt; Bibliography of Old English Literature; New Edition of Warton's History of English Poetry; &c.

Head, the term applied to the anterior part of the body of an animal when marked off by a difference in size, or by a constriction (neck). A gradual increase of complexity in the structure of the head is observable as we ascend from the lowest to the highest forms of life. In the Protozoa, Infusoria, and Cœlenterates nothing that can be regarded as a head is found, and it is not till we ascend to the worms proper, the articulated animals (crustaceans, myriapods, spiders, and insects), the land and fresh-water gasteropods (snails and whelks), and the cuttle-fishes, that a head proper is found. The cuttle-fishes have a remarkable cartilaginous box, which, like a skull, protects their anterior nervous ganglia and gives support to the muscles. The head of the vertebrated animals presents a regular series of increasing complexity from the lancelet upwards, and as the anterior nervous mass enlarges, and its ganglia increase in complexity, so do the anterior vertebræ change their character; as the brain becomes specialized, so does the brain-case or skull, attaining its highest development in man. In man, and in the higher vertebrates, the head consists of an upper chamber, lodging the brain, the eyes, and other sense organs, and a lower, lodging the first portion of the alimentary canal. In proportion as the vertebrates become developed, the brain increases in size, and its position advances anteriorly, until, in man, it comes to overhang the face. The head is the seat of intelligence and of consciousness, as it contains the brain and the organs of sense, touch being the only sense not limited to it. See *Skull*.

Head, Sir Francis Bond, miscellaneous writer, brother of the following, born 1793, died 1875. He was present at the battle of Waterloo, being in the royal engineers; in 1825 undertook the working of gold and silver mines in Rio de la Plata; in 1835 be-

came governor of Upper Canada, and in 1838 suppressed the Canadian insurrection, and was made a baronet. He was the author of Bubbles from the Brunnen of Nassau, Rough Notes of Rapid Journeys across the Pampas, A Faggot of French Sticks, The Horse and his Rider, &c.

Head, Sir George, a writer of travels, &c., born 1782, died 1855. He held various posts in the army, and was present at most of the great battles of the Peninsula. In 1814 he proceeded to Canada to be chief of the commissariat of a proposed navy on the Canadian lakes, and subsequently published his experiences in Forest Scenes and Incidents in the Wilds of North America. He was knighted in 1831. He also wrote Rome, A Tour of Many Days, translations of Pacca's Memoirs, and of Apuleius, with other works.

Headache (*Cephalalgia*) arises from a variety of causes. The principal forms it assumes are:—(1) *Congestive Headache*, arising from over-fulness of blood. It may be cured by purgatives, while reduction of the diet and saline medicines are beneficial. (2) *Anæmic Headache*, which arises from a deficiency of blood, and occurs in persons badly fed or in weak girls. Good food and iron tonic, with application of cold to the head, are often of service in such cases. (3) *Nervous Headache*, which often attacks the studious, and which is relieved by nerve tonics, and especially by phosphorus pills. (4) *Neuralgic Headache*, which is often due to exposure to cold. What is called *Hemicrania* or *Megrim*, which is the limitation of the headache to one-half or less of the head, is often treated with bromide of potassium. In cases in which headache arises from disease of the liver, nausea results, and this characterizes *bilious* headache. Impurity of blood and gouty affections, as well as disease of the kidneys, are frequent sources of headache.

Healds. See *Heddles.*

Health is that condition of the living body in which all the bodily functions are performed easily and perfectly, and unattended with pain. The most perfect state of health is generally connected with a certain condition of the bodily organs, and well marked by certain external signs. See *Sanitary Science.*

Health, Bill of. See *Bill.*

Health Acts (Public), acts passed in order to secure the good sanitary condition of any country or district. The first British Public Health Act was passed in 1848, and was followed by others, which, with the exception of those parts of them relating to London, were repealed by the Public Health Act (1875). It divides England (London excepted) into 'urban' and 'rural' sanitary districts. The act contains provisions respecting sewers, offensive trades, unsound meats, slaughter-houses, epidemic diseases, and all matters concerning the public health.

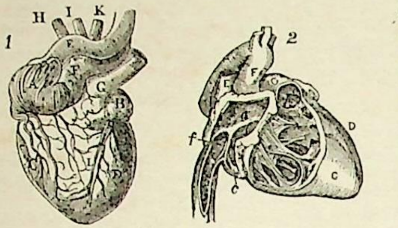
Hearing. See *Ear* and *Acoustics.*

Hearne (hėrn), Thomas, an English antiquary, born 1678, died 1735. Hearne studied at Oxford, and was in 1701 appointed assistant-keeper of the Bodleian Library, and he held the post of second librarian from 1712 to 1715, but had to resign as his Jacobite principles precluded him from taking the oaths to the government. Among his works may be mentioned Ductor Historicus, Reliquiæ Bodleianæ, History and Antiquities of Glastonbury, editions of Leland, of Spelman's Life of Alfred, Fordun's Scotichronicon, &c.

Hearsay Evidence. See *Evidence.*

Heart, a hollow muscular organ, the function of which is to maintain the circulation of the blood, the organs of circulation being the heart, the arteries, the veins, and the capillary vessels. The heart in men, quadrupeds, birds, and some reptiles is composed of four cavities, two *auricles* and two *ventricles.* It is enveloped in a membrane called the *pericardium*, and is situated toward the left of the cavity of the chest, between the lungs. With each beat the apex of the heart strikes against the wall of the chest in the space between the 5th and 6th ribs, a little below and to the right of the left nipple. The right auricle communicates with the right ventricle, besides which there are in it three openings, that of the *vena cava inferior*, that of the *vena cava superior*, and that of the *coronary vein.* The communication between this auricle and ventricle is closed by a valve when the ventricle contracts. The right ventricle communicates with the pulmonary artery, the opening into the artery being guarded by a valve formed of three flaps. When these are brought together they interrupt the communication between the ventricle and the artery. The left auricle communicates through a valved opening with the left ventricle, and contains the orifices of the four pulmonary veins. The left ventricle, besides the communication with the left auricle, contains the orifice of the aorta, also provided with a valve

similar to that of the pulmonary artery. The auricles and ventricle of one side are separated from those of the other by a complete muscular partition, the *septum cordis.* The valves at the openings of the arteries are called *semilunar*, that at the orifice of the right auricle *tricuspid*, that at the orifice of



Human Heart.

Fig. 1, Exterior. A, Right auricle. B, Left auricle. C, Right ventricle. D, Left ventricle. E, Vena cava superior. F, Aorta. G, Pulmonary artery. H, Brachiocephalic trunk. I, Left primitive carotid artery. K, Left subclavian artery. L, Left coronary artery.

Fig. 2, Section, right side. C, D, E, F, G as in fig. 1. *a*, Cavity of right auricle. *b*, Inferior vena cava. *c*, Coronary valve. *d*, Entrance of the auriculo-ventricular opening. *e*, Valve of the pulmonary artery. *f*, Fossa ovalis.

the left auricle *mitral*, and that at the orifice of the vena cava inferior the *Eustachian* valve. The heart is formed of a firm thick muscular tissue, composed of fibres interlacing so as to form a figure of eight. It also contains nerves and vessels. The arteries carry the blood from the heart to all parts of the body. They terminate in the capillary vessels, a series of extremely minute tubes which pass over into the veins. The veins are the channels by which the blood passes back from the body to the right auricle of the heart. The blood which is returned from the veins is purplish red, from excess of carbonic acid gas and deficiency in oxygen, and is called *venous;* that which leaves the heart is bright red, being oxygenated, and is called *arterial.* The venous blood parts with its excess of carbonic acid and receives new supplies of oxygen in the capillary system of the lungs, flows into the pulmonary veins, thence into the left cavities of the heart, thence it passes into the aorta, and is transmitted to all parts of the body, returning to the veins by the capillary system. It is now become venous, passes through the veins from the extremities towards the heart, receiving the chyle and the lymph, and is emptied into the right cavities of that organ, which returns it through the pulmonary artery to the capillary vessels of the lungs, where it is subjected to the influence of the air, resumes the qualities of red or arterial blood, and is ready for a new course.

The mechanism of the circulation is as follows:—The blood contained in the two venæ cavæ is poured into the right auricle, which contracts, and thus forces the fluid to escape; but the venæ cavæ oppose to its backward passage the column of blood which they contain, and it must therefore pass into the right ventricle. The ventricle then contracts, and the tricuspid valve closing the passage through which the liquid entered, it is forced into the pulmonary artery, along which it must flow (return to the ventricle being prevented by the semilunar valve) into the capillary system of the lungs, whence it passes into the pulmonary veins, which pour it into the left auricle by four orifices. The contraction of the auricle impels it into the left ventricle, by which it is driven forward into the aorta (the mitral valve preventing its return into the auricle), and thence into the general circulation. The two auricles contract and relax simultaneously with each other, as do also the two ventricles. The relaxation is called *diastole;* the contraction *systole.* The quantity of blood projected at each systole is generally estimated at six ounces. The causes of the alternate contraction and relaxation are entirely involuntary and dependent on the nervous system to a large extent. The systole of the ventricles is the cause of the motion of the blood in the arteries, which dilate with each wave driven into them.

The heart is the seat of various and generally dangerous diseases. One of these is *pericarditis* or inflammation of the pericardium, the double lining membrane or bag enveloping the heart. The cause of this disease may be exposure to cold, or an injury, or it may be complicated with other diseases. Inflammation of the inner lining is termed *endocarditis. Valvular* disease is a common affection of the heart, the valves becoming thickened, contracted, rigid, or otherwise affected, so that they cannot properly perform their duty. The mitral valve, for instance, may become too narrow and contracted, and the result is that all the blood does not pass into the aorta. In other cases of valvular disease, the same result follows, viz. imperfect depletion of the ventricles and auricles, the return of blood being termed *regurgitation.* The heart consequently becomes weakened, while the entire system suffers. *Overgrowth* or *hypertrophy*

and *dilatation* are frequent results of valvular disease. In such cases the avoidance of violent exercises and emotions is necessary. The use of *digitalis* is often successful in strengthening and soothing the heart. Certain diseases produce atrophy, in which the heart becomes feeble in action, while *fatty degeneration* occurs, when the muscular fibres are replaced by oleaginous particles. This renders the heart peculiarly liable to rupture under any strain or violent emotion, hence such should be carefully avoided by patients. Among other organic diseases of the heart are *angina pectoris* (the cause of which is uncertain), distinguished by a sense of strangling or suffocation in the breast. *Neuralgia* of the heart is similar in symptoms to angina. A very common heart ailment is *palpitation*, often caused by indigestion, and the excessive use of tea and tobacco. *Syncope* or *fainting* results from the sudden cessation of the heart's action, and may be caused by excitement, emotion or shock of some kind. Some of the above forms of heart disease can be discovered only by auscultation or percussion; others are very evident to non-professional observers.

Heart's-ease. See *Violet.*

Heart-urchin, the name applied to certain genera of sea-urchins on account of their cordate or heart shape.

Heat, the name given to a peculiar sensation, and also to the agent which produces it, this being now believed to be a certain motion in the minute molecules of which all bodies are composed.

One of the most obvious effects of heat is to alter the *temperature* of bodies. In almost all cases when heat is supplied to a body, the temperature of the body rises, and when heat is removed the temperature of the body falls. If the increase of temperature is evident, and such as may be noted by the thermometer, the heat is then termed *sensible;* if not, as in the case of ice immediately melted, it is termed *latent.* Temperature is, in fact, the tendency that a body has to impart heat to other bodies. If two bodies impart no heat to each other when in contact, they are said to have the same temperature. When the one possesses more heat than the other there is an impartation of heat from the former until the temperature is equalized. Different bodies require very different amounts of heat in order to raise their temperature through the same number of degrees. Thus it requires about thirty times as much heat to raise the temperature of 1 lb. of water 1° as to raise the temperature of 1 lb. of mercury by the same amount. The terms *capacity for heat* and *specific heat* are used in relation to this property of bodies. The capacity for heat of a body is the quantity of heat required to raise its temperature 1° from some fixed point, as from 0° C., or from 32° Fah. The specific heat of a substance is the ratio between the quantity of heat required to raise the temperature of the substance 1° from some fixed point and the quantity of heat required to raise the temperature of an equal mass of distilled water 1° from 0° C.

Heat changes the *dimensions* of bodies. Increase of volume is the normal effect, although the reverse is observed in water between 0° C. and 4° C., and in iron and bismuth. Between moderate limits bodies expand nearly regularly with the temperature, but this does not hold good of the more extreme limits. (See *Expansion.*) Addition of heat *liquefies solid bodies,* and converts *liquids into gases.* During the conversion of a solid into a liquid, or a liquid into a gas, a considerable quantity of heat is absorbed, and in the reverse process heat is given out; but this is one of the cases in which, though heat is taken in or given out, the temperature is not altered. Hence the heat is said to be made *latent.* Heat also alters the power of bodies for *conducting electricity.* In solids the conductivity is diminished to a great extent by an increase of a few degrees in the temperature. In liquids, on the other hand, increase of temperature increases the conductivity. The magnetic properties of bodies are also changed by heat. For example, an iron bar that has been magnetized suddenly loses the whole of its magnetism at a particular temperature. Heat possesses the power of altering the *chemical properties* of bodies. In some cases it breaks up chemical compounds, but in general it favours chemical combination.

In measuring quantities of heat various units may be adopted, as, for instance, the quantity necessary to melt a pound of ice. But the unit quantity of heat now generally fixed on (the Centigrade thermometer and metrical system being employed) is the quantity of heat which will raise the temperature of 1 gramme of distilled water from 0° C. to 1° C.; or 1 lb. of water may be used instead of 1 gramme, and one degree Fahrenheit instead of one degree Centigrade.

Calorimetry is the technical name given to the part of the subject that deals with the practical measurement of quantities of heat.

When heat is applied to one end of a bar of iron it is propagated through the substance of the bar, producing a rise of temperature which is first perceptible at near, and afterwards at remote portions. This transmission of heat is called *conductivity*. The best *conductors* are metals, but all bodies conduct more or less. The best conductor is silver, next follow in order of their conductivity copper, gold, brass, zinc, tin, steel, iron, lead. With the exception of mercury and other melted metals, liquids are exceedingly bad conductors of heat. This can be shown by heating the upper part of a column of liquid and observing the variations of temperature below. These will be found to be scarcely perceptible and to be very slowly produced. If the heat were applied below we should have the process called the *convection of heat;* the lower layers of liquid would rise to the surface, and be replaced by others which would rise in their turn, thus producing a circulation and a general heating of the liquid. When the heat is applied above the expanded layers remain in their place, and the rest of the liquid can be heated by conduction and radiation only.

Radiation of heat consists in the propagation of heat from a hotter body to a colder one through an intervening medium which is not heated during the process. The heat is transmitted by the same medium that transmits light from a luminous body. Radiant heat and light are, in fact, the same thing, namely, vibrations of an elastic medium, the luminiferous ether, supposed to fill all space, and they obey the same laws of reflection, refraction, interference, and polarization. They also obey the general laws of wave-motion. A luminous body excites in the ether waves or undulations of a great many different wave-lengths, some of them capable of affecting the eye as light, and others not. Heat rays need not be at all luminous; they may have no light-giving power, but may be what are known as rays of *dark heat*, capable of being detected by the thermometer, but not perceptible to the eye. Other rays are purely *chemical* in their effect (as in photography), and are called *actinic* rays. The general effect of radiation is to equalize the temperature of any system of bodies so placed as to be capable of radiating one to the other. Every body of the system is constantly sending forth heat-rays in all directions, and receiving the heat radiated from the other bodies. But the hotter bodies emit more than they receive, while the colder bodies receive more than they emit, and the temperature of the system is thus gradually equalized. The rapidity or otherwise of radiation differs much in different bodies. The radiation depends on the nature of the surface of the body, and the power of a body to radiate heat is intimately connected with its power of absorbing heat radiated to it, and with its power of reflecting heat. Surfaces that are good radiators are good absorbers, and surfaces that absorb heat readily reflect it badly. Thus, a kettle covered with soot loses, when filled with hot water, heat more rapidly than one with a brightly polished surface. The best absorber of all is a surface covered with a thin coating of lamp-black. Brightly polished metals are the worst absorbers among bodies that are not transparent to radiant heat.

The transmission of radiant heat through various substances is a subject of great importance. In this connection the terms *diathermanous* and *athermanous* correspond to *transparent* and *opaque* in the case of light. One of the chief diathermanous bodies is rock-salt. Common white glass transmits rays of high refrangibility, stopping those of low refrangibility. Hence its use as a fire-screen. For the greater part of the heat of a common fire is of the dark kind, and is nearly all stopped by the glass; but glass does not screen from the heat of the sun, a great part of which consists of heat of high refrangibility. On the other hand, smoked rock-salt transmits very little of the heat of high refrangibility, though it is almost perfectly diathermanous to dark heat.

The nature of heat was long a subject of active controversy. The common theory during the last century, and in the early part of the present, was the *materialistic*, or that by which heat was regarded as an imponderable fluid (*caloric*), which could permeate all matter, and which, uniting with the particles of bodies, produced the phenomena associated with heat. The materialistic theory was held by Black and Lavoisier, but it was exploded by the experiments of Rumford and Davy. Among the contributions of Davy to the science was his celebrated experiment of rubbing together two pieces of ice, while surrounded by an ice-cold atmosphere, until they melted away completely. He concluded that 'the immediate

cause of the phenomenon of heat is motion, and the laws of its communication are precisely the same as the laws of the communication of motion.' Between 1840 and 1843 Joule conclusively established the truth of this theory—the *dynamical theory* of heat—by measuring the amount of energy required to produce a definite heating effect, and by showing that the quantity of heat obtained by expending a definite amount of energy in friction is the same whatever is the nature of the body in which the friction takes place. The conclusions arrived at by him are thus given:—

1st. The quantity of heat produced by the friction of bodies, whether solid or liquid, is always proportional to the quantity of work expended.

2d. The quantity of heat capable of increasing the temperature of 1 lb. of water by 1° Fah. requires for its evolution the expenditure of mechanical energy represented by the fall of 772 lbs. through 1 foot. This amount of energy or work, equal to 772 *foot-pounds*, is called the *dynamical equivalent of heat.*

That heat is a form of energy is now considered by all to be beyond question. Every substance is considered to have some kind of molecular structure, and heat is regarded as consisting in the relative motions of the molecules or particles. The greater the energy of the motion the higher the temperature of the body, so long as it maintains its original state, solid, liquid, or gaseous; and an alteration in the nature of the motion probably constitutes the change from one of the states of matter to another. After the time of Rumford and Davy, Fourier and Carnot were highly distinguished for their inquiries into the mathematical theory of heat. Fourier investigated the theory of conduction and radiation, while on the investigations of Carnot has been founded the branch of Thermo-dynamics, which treats of the conversion of heat into mechanical force or energy, and *vice versâ*. (See *Thermo-dynamics.*) The investigations of Joule and the discovery of the quantitative equivalence of energy with heat, led to the enunciation of the theory of the *conservation of energy.* See *Energy.*

Heat-engine. See *Thermo-dynamic Engine.*

Heath, the common name of many plants of the nat. order Ericaceæ. Those that belong to the genus *Erica* have their leaves simple and entire; their flowers oval, cylindrical, or even swelled at the base; the corolla is four-cleft; the stamens eight, terminated by anthers which are usually notched or bi-aristate at the summit, and the fruit dry, four or eight-celled. From 400 to 500 species are known, twelve or fifteen of which inhabit Europe, and have small flowers, whilst all the remainder are natives of South Africa (the vicinity of the Cape of Good Hope). Many of them bear brilliantly coloured flowers. In Britain six species are enumerated, of which *E. tetralix* and *E. cinerea* are the most common, both with beautiful bell-shaped flowers. Another very common species is the common ling or heather, *Callūna vulgāris* (*Callūna* having been made a separate genus from *Erīca*), a low shrub, which often covers exclusively extensive tracts of barren land.

Heathfield, GEORGE AUGUSTUS ELLIOT, LORD, British general, born in Roxburghshire in 1718, died 1790. He studied at the University of Leyden, and at the French military school at La Fère, and served for some time in the Prussian army. He entered the British army in 1735, was wounded at Dettingen in 1743, and in 1762 took part in the capture of Havannah. In 1775 he became commander-in-chief of the forces in Ireland, and soon after governor of Gibraltar. Spain and France having sided with America against Britain, Gibraltar was besieged by the two former powers, and successfully defended by Elliot from 1779 to 1783, the siege and defence being among the most memorable in history. The king sent Elliot the order of the Bath, and shortly after he returned to England, and was created Baron Heathfield in 1787.

Heat Spectrum, the part of the spectrum from an incandescent body that contains invisible heat rays. To produce the heat spectrum properly lenses and prisms of rock-salt must be employed. When the spectrum from the sun is examined it is found that the maximum heat intensity is in the dark-heat spectrum at a considerable distance from the place where light ceases to be perceptible.

Heaven (probably signifying that which is *heaved* up or elevated), in a physical sense, the azure vault which spreads above us like a hollow hemisphere, and appears to rest on the earth at the horizon. It is in reality merely the appearance presented to us by the immeasurable space in which the heavenly bodies move. According to some its azure colour is due to the light of the celes-

tial bodies reflected from the earth to the air, and thence back again. According to others the reflection is not from the air, but from its contained vapours. A theory recently broached assigns the azure colour to the presence of particles of dust in the air. In theology, this word denotes a region of the universe where God's presence is especially manifested, in contrast with the earth. According to the Hebrew scriptures heaven consisted of three regions:—(1) That of the clouds, or air; (2) that of the stars; and (3) the abode of God. They also divide it into two parts, 'The Heaven' and the 'Heaven of Heavens.' Among the Greeks the gods were supposed to reside on Olympus, and the classic poets placed the abode of the just in the Elysian fields. The heaven of Islam is a scene of sensuous enjoyment, while that of the Buddhist consists in *Nirvana*, regarded by some as meaning the absorption of individual existence in the great ocean of being. The ancient German had his Walhalla, and the American Indian has his happy hunting grounds. Among Christians the general opinion is that heaven is the residence of the Most High, the holy angels, and the spirits of just men made perfect, that this abode is eternal, and its joys intensely spiritual.

Heavy Spar. See *Baryta*.

Hēbē, in Greek mythology, the goddess of youth, and the cup-bearer to the gods, until replaced by Ganymede; a daughter of Zeus and Hera, who gave her as a wife to Heracles. In the arts she is represented with the cup in which she presents the nectar, under the figure of a charming young girl, her dress adorned with roses, and wearing a wreath of flowers.


Hebē, statue by Canova.

Heber, REGINALD, D.D., an English poet and bishop, was born 1783, died 1826. In 1800 he entered Brasenose College, Oxford, and in 1803 wrote his celebrated prize poem of Palestine. After travelling on the Continent he became, in 1807, rector of Hodnet, and having married Amelia, daughter of the dean of St. Asaph, was appointed prebend of the cathedral. On the death of Bishop Middleton, Heber was consecrated Bishop of Calcutta in 1823; but he had only occupied the position for about two years when he died of apoplexy at Trichinopoli, in 1826. In addition to his hymns, the best known productions are Palestine; an edition of the works of Jeremy Taylor (with Life); Poems and Translations.

Hébert (ā-bār), JACQUES RENÉ, notorious during the French revolution, was born at Alençon in 1757, executed 1794. Hébert first attracted notice as editor of the violent Jacobin organ Le Père Duchesne. In 1792 he became a member of the municipality of Paris, which contributed to the massacres of September, and he was named attorney-general under the commune. In 1793 the Girondists procured his arrest, but he was released by the convention. He was one of those who established the worship of reason, and he was always on the side of bloody measures. Having denounced Danton, the latter, in conjunction with Robespierre, secured his destruction by the guillotine in 1794.

Hebrew Language and Literature, the language and literature of the Jews, Israelites, or Hebrews, especially at that period when they formed a compact nation inhabiting Canaan or Palestine. (For a sketch of the history of the people see *Jews*.) The Hebrew language forms a branch of the Semitic family of languages, being akin to the Aramaic (Chaldee and Syriac), Arabic, Ethiopic, and Assyrian. In the antiquity of its extant literary remains Hebrew far surpasses the other Semitic idioms, and in richness and development is only inferior to the Arabic. The language is deficient in grammatical technicalities, especially in moods and tenses of the verb, in the absence of the neuter gender, &c. Its roots are triliteral (consisting of three consonants), and words are derived from them by the reduplication of the letters of the root, and by the addition of formative elements before and after the roots. The alphabet is composed of twenty-two consonants, the vowels being expressed by marks above or below these letters. The accents and marks of punctuation amount to about forty. The writing is from right to left. There are three kinds of Hebrew alphabet now in use—the square or Assyrian (properly called the Babylonian), the most common; the rabbinical, or mediæval; and the cursive, or alphabet used in ordinary writing.

The extant classical Hebrew writings em-

brace a period of more than 1000 years from the era of Moses to the date of the composition of the books of Chronicles, which stand last in the Hebrew Bible. During this period the written language underwent surprisingly little change. In passing from the book of Genesis to the books of Samuel we do not recognize any very striking difference in the language. Even those who assert that the Pentateuch as a whole is of a comparatively late era, admit the great antiquity of some of its contents, which do not differ in language from the rest. There is indeed to be observed a very decided difference in style and language between the earliest and the very latest Hebrew writings; but this change was sudden, hence Hebrew literature is distinguished into Pre-exilian and Post-exilian, the Babylonish captivity forming the break between the two. The writings which belong to the age subsequent to the Babylonish captivity differ very considerably from those which belong to the preceding age; the influence of the Aramaic or Chaldee language, acquired by the Jews in the land of their exile, having greatly corrupted the tongue. The historical books belonging to this age are the books of Chronicles, Ezra, Nehemiah, and Esther. In the prophets who prophesied during and after the captivity, with the exception of Daniel, the Aramaic impress is by no means so strong as we might anticipate, they having evidently formed their style on that of the older prophets. At what time Aramaic became the dominant element in the national language it is impossible to determine, but latterly it entirely took the place of the old Hebrew as a spoken tongue. The fragments of the popular language in the New Testament are all Aramaic; and ever since the Hebrew proper has been preserved and cultivated only as the language of the learned and of books and not of common life.

After the return from the captivity, the Jewish literature was carefully cultivated. Under Ezra the Scriptures were collected, and arranged into a canon. The Pentateuch was publicly read, taught in schools, and translated into Aramaic. The legal or religious traditions explanatory or complementary to the law of Moses were collected and established as the oral law. These labours resulted in the Midrash, a general exposition of the Old Testament, divided into the Halacha and the Haggada. To the Maccabean era belong the Apocrypha (in Greek), various Greek versions of the Bible, and several collections of prayers, poems, and proverbs. To the succeeding epoch belong some celebrated doctors of the law—Hillel, Shammai, Gamaliel, and others; while the age following the destruction of Jerusalem (A.D. 70) witnessed the completion of the New Testament and the works of Josephus, written, however, in the Greek language. On being driven from their capital by the Romans, numerous schools were established by the Jews in which their language and literature were taught. Of these schools the most celebrated were those of Babylon and Tiberias. The Mishna, which contains the traditions of the Jews and interpretations of the Scriptures, is supposed to have been compiled in the latter part of the 2d or in the earlier part of the 3d century; and the rabbis of Tiberias and Babylon wrote numerous commentaries on it. These commentaries were at length collected into two separate works, the Jerusalem and the Babylonian Talmuds. The Jerusalem Talmud seems to have been completed about the end of the 4th century, and the Babylonian Talmud about a century later, under the care of Rabbi Ashe. What are called the *Targums*—that is Aramaic translations of portions of the Old Testament—belong partly to times somewhat anterior, partly to times subsequent to this period. The Jews latterly adopted the languages of the various peoples among whom they happened to dwell, though they also wrote in classical Hebrew as well as in the less pure form of the *Rabbinical* Hebrew. The most brilliant epoch of mediæval Jewish literature is that of the domination of the Moors in Spain. Of modern literature in the Hebrew language there is little that is of general interest.

Hebrews, Epistle to the, one of the books of the New Testament, the canonicity and authorship of which have been much discussed. The immediate successors of the apostles (Clement of Rome, Justin Martyr, &c.) seem to have considered it as of canonical authority. Its canonicity was also maintained by St. Jerome, by the almost universal consent of the Latin and Greek churches, and by Ambrose of Milan; while in 416 a decretal of Innocent III. was issued in favour of this view. As to the authorship, the early Roman church denied its Pauline origin. In Carthage it was (in the 2d century) ascribed to Barnabas, while at the same time in Alexandria it was ascribed to Paul.

This view was supported by Clement of Alexandria, and Origen, the former believing that it was written by Paul in Hebrew, and translated into Greek by Luke. Latterly the Pauline authorship became generally accepted throughout Christendom, but in modern times the prevalent opinion is that Paul was not the author. The epistle was probably addressed to a Jewish section of the Roman church, although some maintain that it was addressed to Jews of Alexandria. If the latter view be correct Apollos may be the author, although tradition seems to favour the claim of Barnabas.

Heb'rides, or Western Islands (the *Heboudai* of Ptolemy, and *Hebudes* of Pliny, the *r* being an erroneous insertion), a series of islands and islets off the west coast of Scotland, usually divided into the Outer Hebrides (popularly called the Long Island), of which the principal are Lewis and Harris, North Uist, Benbecula, South Uist, and Barra; and the Inner Hebrides—Skye, Mull, Islay, Jura, Coll, Rum, Tiree, Colonsay, &c. The islands within the Firth of Clyde (Arran, Bute, the Cumbraes, &c.) are not now considered as part of the Hebrides. The Outer are separated from the Inner, and from the mainland, by a strait called the Minch, 12 miles broad. The Outer Hebrides consist of a continuous series of islands and islets, running south-west and north-east through a space of 130 miles, having Barra Head at the south extremity, and the Butt of Lewis at the north extremity. The Inner Hebrides are more widely scattered and more irregularly disposed. The Hebrides are divided between the shires of Ross, Inverness, and Argyle. They number upwards of 400 in all, but only about 90 are inhabited; area, about 2800 square miles; pop. (1891), 81,600. The islands are, on the whole, mountainous, and abound in moss and moor. Although humid, the climate is mild. The soil is mostly poor, and agriculture, except in certain localities, especially Islay, is very backward. Oats and barley, with potatoes and turnips, constitute almost the entire produce of the soil. Cattle rearing and fishing are staple industries. The land is mainly occupied by sheep-farmers, and by great numbers of crofters occupying small pieces of arable land and having often the right in common with others to a tract of rough pasture. There are also many cottars or sub-tenants, and excess of population has arisen in various localities from the minute subdivision of land. The condition of the inhabitants generally, is very depressed; their dwellings miserable—the older being without chimneys or windows—and their living poor. Gaelic is the universal language, although English is tolerably well known. The Hebrides were early colonized by Norwegians, and belonged to Norway from the 9th to the 13th century, being annexed to Scotland in 1265. In 1346 a chief of the Macdonald clan assumed the title of 'Lord of the Isles,' and he and his successors affected a sort of semi-independence, but the Hebrides were finally annexed by James V. in 1540.

He'bron (anciently *Kirjath-arba* or *Mamre*, now *El-Khalil*), a town in Palestine, 18 miles south by west of Jerusalem, 2835 feet above sea-level. It lies in the narrow valley of Mamre, and was one of the three cities of refuge west of the Jordan. Its streets are narrow and dirty. A mosque, called *El-Haram*, formerly a church, contains the alleged tombs of Abraham, Isaac, Jacob, Sarah, &c. Hebron is one of the oldest of existing towns. It was the residence of Abraham and the patriarchs, and at one time of David. Pop. about 10,000.

Hecatæ'us, an eminent ancient Greek historian and geographer, born (probably) about 550 B.C.; died about 476 B.C. He visited Egypt, Thrace, Greece, the coasts of the Euxine, Italy, Spain, and Africa. His two great works were his Tour of the World and his Genealogies or Histories. Only fragments of his writings are extant.

Hec'atē, an ancient Greek goddess, whose powers were various. She could bestow wealth, victory, and wisdom; good luck on sailors and hunters; prosperity on youth and on the flocks. She was latterly confounded with other divinities, such as Demēter, Artĕmis, and Persephŏnē (Proserpine), and finally became especially an infernal goddess, and was invoked by magicians and witches. Dogs, honey, and black female lambs were offered to her at places where three roads met. She was often represented with three bodies or three heads, with serpents round her neck.

Hec'atomb (Greek *hecaton*, a hundred, *bous*, an ox), in ancient Greek worship literally a sacrifice of a hundred oxen, but applied generally to the sacrifice of any large number. It was necessary that the victims should be without blemish. Only parts such as the thighs, legs, or hide were burned, the rest furnishing the festive meal at the close of the sacrifice.

Heckles, or HACKLES, an apparatus employed in the preparation of animal and vegetable fibres for spinning. It consists of a series of long metallic teeth, through which the material is drawn so as to comb the fibres out straight and fit them for the subsequent operations. The teeth are fixed in a wooden or metallic base, in several rows, alternating with each other at short distances apart.

Heckmondwike, a thriving town of England, county of York (West Riding), with extensive blanket, carpet, woollen cloth, and woollen yarn manufactories. Pop. 9709.

Hecla, or HEKLA, a volcano of Iceland, about 20 miles from its south-west coast, about 5000 feet in height, and having several craters. It is composed chiefly of basalt and lava, and is always covered with snow. Many eruptions are on record. One of the most tremendous occurred in 1783, after which the volcano remained quiescent till September 1845, when it again became active, and continued with little intermission till November 1846, to discharge ashes, some masses of pumice-stone, and a torrent of lava. The last outbreak was in 1878.

Hector, the son of Priam and Hecuba, the bravest of the Trojans, whose forces he commanded. His wife was Andromache. His exploits are celebrated in the Iliad. Having slain Patroclus, the friend of Achilles, the latter sought revenge, and Hector was slain by him. The body of Hector was dragged at the chariot wheels of the conqueror; but afterwards it was delivered to Priam for a ransom, who gave it a solemn burial. Hector is the most attractive warrior in Homer's Iliad, in which one of the finest episodes is his parting from Andromache before his last combat.

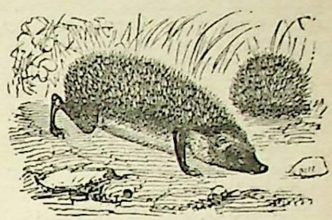
Hec'uba, of Phrygia, in Greek legend the second wife of Priam, king of Troy, to whom she bore Hector, Paris, Cassandra, Troilus, and other children. After the fall of Troy she was given as a slave to Odysseus, and, according to one form of the legend, in despair leaped into the Hellespont.

Heddle, in a loom, one of the parallel double threads which are arranged in sets, and, with their mounting, compose the *harness* for raising the warp threads to form the shed and allow the shuttle to pass. Each heddle has a loop or eye in its centre, through which a warp thread passes.

Hed'era, the genus to which ivy belongs.

Hedge, a fence formed of living trees or shrubs. Hedges are often composed of one or more of the following:—Hawthorn, crab, blackthorn, holly, privet, beech, hornbeam, maple, barberry, furze, broom, alder, poplar, willow, yew, box, arborvitæ, sweet-briar, &c. Although superior to dry-stone walls, they take up much room, and exhaust the soil to some extent. Hedges are probably more common in England than in any other country. It has been calculated that judicious trimming of hedges would increase the cultivated land in England and Wales by 490,000 acres, an effect similar to the addition of a new county of moderate size. They were not very common in England till the close of the seventeenth century.

Hedgehog (*Erinaceus europæus*), an insectivorous animal, covered with spines in lieu of hair. By means of a special muscle it is able to roll itself up into a ball, and in this form can defy most of its enemies. It



Hedgehog (*Erinaceus europæus*).

has a rudimentary tail, elongated nose, short ears, with a cranium comparatively broad. The hind feet have five toes, and strong coarse hair covers some parts of the body. The teeth are numerous. Including the tail, it attains a length of 11 inches. It usually resides in small thickets, and feeds on fruits, roots, and insects. It is fond of raw or roasted flesh, and devours cockroaches in large numbers when kept in houses. It hibernates in winter. The female bears four to eight young at a birth, the young soon becoming covered with prickles. It is found in Britain and in most parts of Europe. Other species are found in Asia and Africa.

Hedgehog Plant, a name bestowed on leguminous plants of the genus *Medicāgo* (especially *M. infestata*) whose pods are spirally twisted and rolled up into a ball and furnished with prickles.

Hedge-hyssop. See *Gratiola.*

Hedge-mustard (*Sisymbrium officināle*), a cruciferous plant, formerly in use as a remedy for catarrh.

Hedge-warbler, or HEDGE-SPARROW (*Accentor modulāris*), a bird of the family Sylviadæ, common in the British Islands and all the temperate parts of Europe. It feeds on insects, worms, and seeds; and its nest, built of green moss, roots, and wool, and lined with hair, is generally finished early in March. The eggs, four or five in number, are bluish green. The cuckoo often deposits her egg in the hedge-warbler's nest. The plumage is generally of a reddish brown, streaked with dark brown. The song of the male is short and plaintive. The length of the bird is about 5½ inches.

Hedgley Moor, in Northumberland, was the scene of a battle in which the Lancastrians were defeated by the Yorkists under Montacute, April 25, 1464.

Hedjaz. See *Hejaz.*

Hedjrah. See *Hejra.*

Hedys'arum. See *French Honeysuckle.*

Heem (hām), JAN DAVID DE, Dutch painter of fruit, flowers, and still life, born in 1600, died in 1674. He studied under his father, and soon obtained large sums for his pictures, which are characterized by great delicacy and attention to detail and truth and brilliancy of colouring. His Madonnas, &c., bordered with garlands of fruits and flowers, were also famous.

Heeren (hā'rèn), ARNOLD HERMANN LUDWIG, German historian, born 1760, died 1842. In 1776 he entered the gymnasium of Bremen, and in 1784 took his degree of Doctor of Philosophy at Göttingen. In 1787, after returning from his travels in Italy, he became professor extraordinary of philosophy at the same university. In 1801 he was elected professor of history. His writings combine extreme accuracy of statement with picturesqueness of style. His principal productions are Geschichte der classischen Liter. im Mittelalter; Handbuch der Geschichte der Staaten des Alterthums, &c.

Hegel (hā'gl), GEORG WILHELM FRIEDRICH, a celebrated German metaphysician, born at Stuttgart 1770, died 1831. He studied at the theological institute of Tübingen from 1788–93, and was next a private tutor at Berne (1793–96), and subsequently at Frankfort-on-the-Main (1797–1800). Having removed to Jena, and contracted an intimacy with Schelling, he devoted himself to metaphysical study. After the battle of Jena, Hegel was employed on a newspaper at Bamberg until 1808, when he became successively rector of Nürnberg Gymnasium, professor of philosophy at Heidelberg (1816), and at Berlin from 1818 to his decease in 1831. Among his works the most important are his Phänomenologie des Geistes (1807), Wissenschaft der Logik (1812–16), Encyclopädie der philosophischen Wissenschaften (1817), and Grundlinien der Philosophie des Rechts oder Naturrecht und Staatswissenschaft (1821). The philosophy of Hegel followed that of Schelling, in adopting as a presupposition the identity of Knowing and Being, of Thought and Reality, of Subjective and Objective. But he differs from Schelling, who contemplates this identity with its inner opposites through the medium of a purely intellectual intuition, for Hegel seems rather to revert to Kant's Transcendental Logic. He thus asserts that if the order and connection of our thoughts is involved in the order and connection of things, the universal form in the course of objective action must exactly agree with the form of the development of our thoughts, and *vice versa*. As there are, according to him, three stages in the process of thought and existence, his system has necessarily a threefold division: logic; the philosophy of nature; and mental philosophy. Hegelianism has been more influential in the direction of the philosophy of religion than in any other department; but it is divided into three camps, representing respectively the supernatural, the rational, and the mystical.

Hegira (hej'i-ra). See *Hejra.*

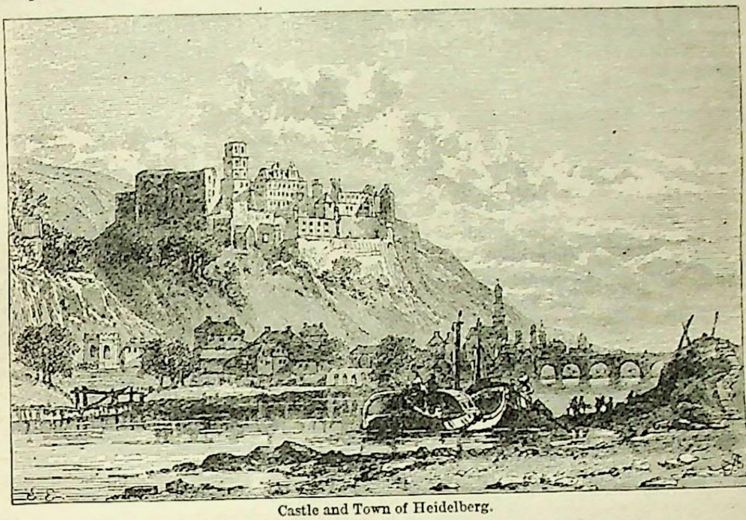
Heide (hī'dė), a town of Prussia, in Holstein, with manufactures of paper, &c. Pop. 7354.

Heidelberg (hī'dl-ber*h*), a town of Baden, beautifully situated on the left bank of the Neckar, here crossed by two bridges, in one of the loveliest districts of Germany. It stands on a narrow strip between the river and the castle-rock and Geisberg, spurs of the Königstuhl (1850 ft.); and chiefly consists of one main street and less important cross and parallel streets. The principal buildings are: the church of St. Peter; the church of the Holy Ghost; the castle, anciently the residence of the Electors Palatine; the university, founded in 1386, and now possessed of a library of 500,000 volumes and attended by about 1000 students; the town-house, &c. The castle, begun in the end of the 13th century, and exhibiting elaborate examples of early and late renaissance architecture, is the most remarkable edifice in Heidelberg. It is now an ivy-clad

ruin, but is carefully preserved from further decay. The principal industry is brewing. One of the greatest curiosities of the place is the Heidelberg tun, kept in a cellar under the castle. It is 36 feet in length, 26 in diameter, and capable of holding 800 hogsheads. Heidelberg is rich in public walks and fine views, that from the Königstuhl being of surpassing beauty. It was long the capital of the Palatinate, but was superseded by Mannheim in 1720. In 1622 Tilly captured and sacked the city. A similar fate overtook it in 1689 and 1693 at the hands of the French. Pop. 31,739.

Heidenheim (hī′dĕn-hīm), a town of Wurtemberg, 46 miles E.S.E. Stuttgart. It has manufactures of woollen and linen cloth, &c. Pop. 6709.

Heights, Measurement of, or Hypsometry, is that department of geodesy which



Castle and Town of Heidelberg.

treats of the measurements of the absolute or relative heights of various points on the earth's surface. In all cases in which great accuracy is essential, trigonometrical methods must be employed, but in other cases sufficiently accurate results may be obtained by levelling, by the use of the barometer, or by the boiling-point of water as given by the thermometer. The trigonometrical method is often the only one available, as the height to be measured may be quite inaccessible. The barometric method is based on the fact that as the mercurial column is supported by the atmospheric pressure, it must fall when conveyed from a lower to a higher level, as in the latter case the pressure is diminished. Were the atmosphere uniform in density throughout, nothing could be simpler than the measurement of heights by the barometer, but gases being very compressible, the lower strata of the atmosphere are denser than the upper strata, being exposed to greater pressure. Thus a column of air 100 feet high, has far greater weight at the sea-level than a similar column at the top of a mountain 4000 feet high; and the effect on the barometric column of rising 100 feet from sea-level is correspondingly greater than the effect of rising 100 feet from a height of 4000 feet above the level of the sea. Moreover, increase of temperature affects the density of the mercury in the barometer, and also that of the air, and further complicates the problem. Hence for the greatest accuracy in determining the difference of levels two mercurial barometers and four thermometers are required. Two of the thermometers are used for determining the temperature of the air at the stations, and two are attached to the barometers for determining the temperature of the mercury. The observations are made simultaneously. The aneroid barometer is in some respects

more suitable than the mercurial, being much more portable, and requiring two thermometers only. After the necessary observations are made the required height may be calculated by the use of certain logarithmic formulæ, or by the rough method stated under *Barometer*. Tables obviating the use of logarithms are often supplied by instrument makers along with aneroid barometers. The method in which use is made of the principle that water boils at the temperature of 212° under the full pressure of the atmosphere but at a lower temperature with a smaller atmospheric pressure, such as is given by an elevated position, is simple and sufficiently accurate for many purposes. It has been found that if water at the sea-level boils at 212° on rising 510 feet it will boil at 211°, and so on.

Heilbronn, a town of Würtemberg, beautifully situated on the Neckar, quite a mediæval place in the older parts, but having modern suburbs. Its finest edifice is the old Gothic church of St. Kilian. It has flourishing industries. Heilbronn was long an imperial free town. Pop. 28,038.

Heiligenstadt (hī'li-gen-stát), a town of Prussia, prov. Saxony, on the Leine. Pop. 5861.

Heimdall, a divinity in the Scandinavian mythology, who keeps watch on the bridge Bifröst, which connects the domain of the Æsir or Gods with that of men. His sight and hearing are acuter than those of mortals, and nothing can evade his vigilance.

Heine (hī'nė), HEINRICH, a German poet and author, was born of Jewish parents at Düsseldorf, 13th December, 1799, and died at Paris 17th Feb. 1856. He studied law at Bonn, Berlin, and Göttingen; took his degree at the last-mentioned place, and in 1825 embraced Christianity. He afterwards lived at Hamburg, Berlin, and Munich, but in 1830 he settled in Paris, supported himself by his literary labours, and dwelt there until his death. From 1837 to the overthrow of Louis Philippe in 1848 he enjoyed a pension of 4800 francs from the French government. Of the numerous literary works of Heine may be mentioned in particular—Gedichte (Poems); Reisebilder (Pictures of Travel); Buch der Lieder (Book of Songs); Deutschland Ein Wintermärchen (Germany, a Winter Tale); Shakspere's Mädchen und Frauen (Maidens and Wives); Die Romantische Schule; Letzte Gedichte und Gedanken (Last Poems and Thoughts); Atta Troll; Romanzero; &c. As a poet Heine is remarkable for the simplicity and pathos of many of his lyric pieces. His powers of wit and raillery were also great, but he often transgressed the bounds of propriety and decorum. Scepticism and over-sensuousness are prominent characteristics. During the latter years of his life he suffered great agony from a spinal complaint, which confined him almost constantly to bed.

Heinec'cius, JOHANN GOTTLIEB, a German writer on logic, jurisprudence, and ethics; born 1681, died 1741. His works on Roman law were highly valued.

Heinrich (hīn'ri*h*), the German form of *Henry*.

Heinsius, DANIEL, Dutch scholar, poet, and critic, born 1580, died 1655. He studied at Franeker and Leyden, at the latter under Joseph Scaliger; became professor of history and politics at Leyden in 1605, and librarian and secretary in 1607. He published editions of Hesiod, Horace, Virgil, and other classical writings, and wrote Latin and Greek poems.

Heir. See *Descent*.

Heir-apparent, the person who necessarily succeeds to the ancestor if he survives him, because no other person can ever gain precedence over him, as an eldest son. Compare *Heir-presumptive*.

Heirloom, in English law, means some personal chattel which goes by special custom to the heir-at-law, together with the inheritance. The term is often applied to the case where certain chattels, such as pictures, &c., are directed by will to follow along with some mansion or estate.

Heir-presumptive is one who, if the ancestor should die immediately, would, under existing circumstances, be his heir, but whose right of inheritance may be defeated by some nearer heir being born, as an only daughter, who is displaced by the birth of a son. Compare *Heir-apparent*.

Hejaz', or HIJAZ', a division of Arabia, extending along the north half of the east coast of the Red Sea, comprehending a lowland (Tehāma) and a tract of highlands, east of a range of mountains attaining a height of perhaps 8000 feet. Mecca, Medina, Jiddah, and Yambo are the chief towns, the two first being annually resorted to by vast numbers of pilgrims. Hejaz forms a part of the Turkish dominions.

Hejra, HEJIRA, or HEGIRA, an Arabic word signifying emigration. The Mohammedans designate by it the flight of Mo-

hammed their prophet from Mecca to Medina. From this flight, which happened on the 13th of September, 622 A.D., but which they fix on the 16th of July of the same year, they begin their computation of time.

Hel, the Norse goddess of the dead, who dwells beneath one of the three roots of the ash Yggdrasil; daughter of Loki. Dark rivers surround her abode; a dog watches without; the horse she rides has three feet; she herself is half black and half of fair complexion.

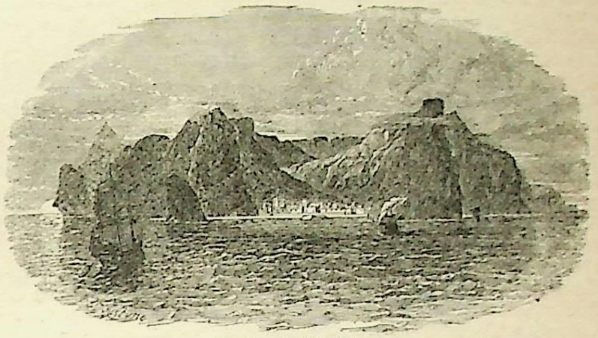
Hel'amys, the jumping-hare or jumping-rat, a genus of rodent animals allied to the jerboas.

Helbeh, the seed of a plant of the leguminous genus *Trigonella* (fenugreek), with a somewhat bitter taste, whose flour, mixed with dhurra, is used as food by the labourers of Egypt.

Helder, The, a fortified seaport of Holland, in the most northern part of the province of North Holland, opposite the island of Texel, and commanding the entrance to the Zuider-Zee. From a fishing town Napoleon converted it to a fortress and naval station of the first rank, and called it his Northern Gibraltar. Being much exposed, the port and coasts are protected by gigantic dikes, one 6 miles long and built entirely of Norwegian granite. Pop. 21,545.

Helen, or Hel'ena, in ancient Greek legend, the most beautiful woman of her age, daughter of Zeus by Leda. By advice of Ulysses her numerous suitors were bound by oath to respect her choice of a husband, and to maintain it even by arms. She chose Menelaus, but was afterwards carried off to Troy by Paris, the Trojan war arising from the claim made by Menelaus for the fulfilment of the oath. After the death of Paris she married his brother Deiphobus. On the fall of Troy she returned to Sparta with Menelaus, but at his death was driven from the country, and was murdered at Rhodes by the queen of the island.

Hel'ena, the name of several saints, of whom the chief was the mother of the Emperor Constantine the Great, a woman of humble origin, and a native either of Bithynia or of Britain. She became the wife of Constantius Chlorus, who, however, was compelled to repudiate her when made Cæsar by Diocletian in 292 A.D. At the same time he made her son his sole heir, and Constantine, on his accession, took her to reside with him at the palace, and gave her the title of Augusta. She did much for the advancement of religion, and is said to have discovered the *true cross*, in honour of which she founded the church of the holy sepulchre at Jerusalem. She died shortly after at the age of eighty, in 328 or 326 A.D.



The Island of St. Helena.

Helena, the capital of Montana, U.S., on the W. side of the valley of Prickly Pear and Ten Mile Creeks, at the foot of the Rocky Mountains, 15 miles W. of Missouri River, and 110 miles N. of Virginia City. It is chiefly supported by the rich quartz and placer gold mines in the vicinity. In the vicinity are hot medicinal springs. Pop. 13,834.

Hele'na, St., an island in the South Atlantic, belonging to Britain, about 850 miles south-east of the Island of Ascension, 1150 miles west from the west coast of S. Africa, and 2000 miles from the east coast of Brazil; greatest length, 10½ miles; greatest breadth, 7 miles; area, about 47 sq. miles. Its position, in the ocean thoroughfare from Europe to the East, has made it a place of call for vessels, while it has acquired special celebrity as the place of Napoleon's banishment, and where he resided from 1816 till his death in 1821. It has precipitous and almost inaccessible coasts, particularly on the north, where almost perpendicular cliffs rise to

from 600 to 1200 feet. The only town on the island is James' Town, which has a fine natural harbour, and affords excellent anchorage in 12 fathoms. The island, which is of volcanic formation, derives its name from having been discovered by Juan de Nova Castilla on St. Helena's day. It was afterwards possessed by the Dutch, and finally was ceded to the English about 1651. Properly speaking there are neither manufactures nor trade. About one-fifth of the entire surface is available for cultivation, while the uplands feed large numbers of goats. Pop. 4116.

Helensburgh, a town of Scotland, in Dumbartonshire, prettily situated at the entrance of the Gare Loch, on the north shore of the Firth of Clyde, opposite Greenock, from which it is distant about 4 miles. It is chiefly a residential town and summer resort for Glasgow and neighbouring towns. It takes its name from Helen, wife of Sir James Colquhoun, by whom it was founded in 1777. Pop. 8409.

Hel'enus, a Trojan soothsayer, son of Priam and Hecuba, twin-brother of Cassandra, and husband of Andromache after Hector's death. He foretold the destiny of Æneas.

Heli'acal, in astronomy, rising or setting at the same time, or nearly the same time, as the sun. The heliacal rising of a star is when, after being in conjunction with the sun and invisible, it emerges from the light so as to be visible in the morning before sunrising. On the contrary, the heliacal setting of a star is when the sun approaches so near as to render it invisible by its superior splendour.

Helian'themum, a genus of herbaceous undershrubs and shrubby or creeping plants; the rock-rose genus.

Helian'thus, a genus of Compositæ, chiefly North American annual or perennial herbs, with rough leaves and large yellow flowers, of which the common sunflower (*H. annuus*) and the *H. tuberōsus* (the Jerusalem artichoke) are examples.

Helic'idæ, the general name by which the land shell-snails are distinguished. See *Helix*.

Hel'icon (now *Sagara*), a mountain range of Greece, in the west of Bœotia, in some sense a continuation of the range of Parnassus. It was the favourite seat of the Muses, who, with Apollo, had temples here. In it also were the fountains of Aganippe and Hippocrene. The highest summit, now called *Paleovuni*, is barely 5000 feet high.

Helic'tis, a genus of carnivorous quadrupeds, allied to the skunks, of which there are at least two species, one (*H. moschāta*) found in China, the other (*H. orientālis*) in Nepâl.

Helier, St., the capital of the island of Jersey, on the south coast, on the east side of St. Aubin's Bay. It is protected by two fortresses, Elizabeth Castle, on a rock in the bay, opposite the town; and Fort Regent, overlooking the inner harbour. The chief public building is the House of Assembly, which, however, has little architectural merit. The harbour, docks, and quays are commodious, and there is a considerable shipping trade. The mild climate and cheapness of living make it a favourite place of residence and summer resort. It is the seat of the states, or representative parliament of Jersey, and the terminus of two small railways. Pop. 29,133.

Heligoland (Danish, *Helgoland*—Holy Land), an island belonging to Germany, in the North Sea, about 40 miles from the mouth of the Elbe; 1¼ mile long and ½ mile broad; highest point, 200 feet. Its rocks, of reddish sandstone, present a perpendicular face to the sea, but are being rapidly eaten away by the waves. The island produces potatoes, barley, and oats, but oysters and lobsters are the chief products. The town consists of about 400 houses, and is much resorted to for sea-bathing. The inhabitants, of Frisian descent, are mainly fishers, pilots, and lodging-house keepers. Heligoland was captured by Britain from Denmark in 1807, and ceded to Germany in 1890. Pop. 2001.

Heliodo'rus, a Greek romance writer, born at Emesa, in Syria, in the 4th century. Though of the family of priests of the Syrian god of the Sun, he became a Christian, and Bishop of Tricca in Thessaly. His youthful work, Æthiopica, or the Loves of Theagenes and Charicleia, is a tale of adventure in poetical prose, with an almost epic tone. It is, however, sometimes asserted that Heliodorus, the romance-writer, was a Neo-Pythagorean sophist of the 3d century, erroneously confounded with the bishop.

Heliogab'alus, or Elagabalus, a Roman emperor, son of Sextus Varius Marcellus; born about A.D. 205, and originally called *Varius Avitus Bassianus*. He received his name from having been, while still a child, priest of Elagabalus, the Syro-Phœnician Sun-god. After the death of Macrinus he was invested, at the age of fourteen, with

the imperial purple, but his licentiousness soon displeased the populace, and he was slain in an insurrection of the prætorians, A.D. 222, after a reign of less than four years.

He'liograph, or HELIOSTAT, a name given to various contrivances for reflecting the sun's light either temporarily or continuously to an observer at a distance. The simplest heliostat is a mirror hung up at a distant station so as to reflect a flash to the observer whose station may be many miles from it. This mirror is generally so adjusted that the flash occurs exactly at some prearranged hour, and by being in readiness the observer can get an observation with precision as regards time. Some heliostats are visible for 80 miles. By being fitted with an adjustment of clock-work, the mirror can be made to revolve with the sun, and so to reflect a beam of sunlight steadily in one direction, being then called also *heliotrope*. The heliostat has been used for signalling in war.

Heliogravure, or PHOTOGRAVURE, is a photo-mechanical printing process. A photograph of any object, as a painting, &c., is taken, and from the negative so obtained a positive print is made on gelatinized paper. This print is transferred upon a highly polished copper plate, and a solution of terchloride of iron is poured upon it, which penetrates through the gelatine and etches the picture upon the copper. The final result is the production of a photo-etched copper plate, from which a large number of impressions can be taken.

He'liolite, a synonym of sunstone or avanturine felspar.

Heliom'eter, an instrument for measuring small distances on the sky, particularly the apparent diameters of the sun and of the moon. It was invented by Bouguer in 1747, and improved by Dollond and Fraunhofer. In the common modern form the object-glass of the telescope is cut into two halves, relatively movable by a screw. Each half forms a perfect image in the focus of the eye-piece, and by varying the distance between the half-lenses the images may be made to diverge from, or approach, each other. If, in contemplating a celestial body, the object-glasses are placed so as to bring the images to touch each other, the distance of the centres of the object-glasses, measured in seconds, gives the diameter of the image.

Heliop'olis (City of the Sun), the On, Rameses, or Beth-shemesh of the Hebrew Scriptures; now called Matarieh; situated a little north of Memphis, and one of the most ancient and extensive cities of Egypt under the Pharaohs. It had a magnificent temple dedicated to Re; and communicated with the Nile by lakes and canals. During the flourishing ages of the Egyptian monarchy the priests taught within the precincts of its temples, and both Eudoxus and Plato visited its famous schools. Here Joseph and Mary are said to have rested with the infant Christ. Near the village stands the Pillar of On, supposed to be the oldest Egyptian obelisk, 67½ feet high, and 6 feet broad at base. The Turks were defeated here by the French in 1800.

Heliopolis, in Cœlosyria. See *Baalbek*.

He'lios, the god of the sun (Latin, *Sol*) in the Greek mythology; son of Hyperion and Theia, and brother of Eos (Aurora, the dawn) and Selēnē (Luna, the moon). He dwells with Eos in the ocean behind Colchis, from which he issues in the morning, and to which he returns at night. His worship was extensively diffused, and he had temples in Corinth, Argos, Trœzene, Elis, but particularly in Rhodes, the Colossus of which was a representation of Helios.

He'lioscope, a telescope fitted for viewing the sun without distressing the eyes, as when the image of the sun is received upon mirrors formed simply of surfaces of transparent glass which reflect only a small portion of the light.

He'liostat. See *Heliograph*.

He'liotrope, a genus of plants (*Heliotropium*), natural order Boraginaceæ. The species are herbs or undershrubs, mostly natives of the warmer parts of the world, and have alternate leaves and small flowers usually disposed in scorpioid cymes. *H. europæum*, the common heliotrope, is indigenous in the south and west of Europe, and has small white or pale red flowers with a fruit of four drupes under a thin fleshy covering. The *H. peruvianum* is a very fragrant garden plant, growing to about 2 feet in height and bearing small lilac-blue flowers.



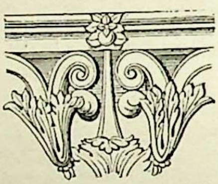
Heliotrope (Jenny Lind variety).

Heliotrope, the bloodstone, a variety of quartz, partaking of the character of jasper or of chalcedony. It is of a deep green colour,

and covered with red spots. It is hard, and is used for burnishers; the more finely-marked stones are prized for seals, signet-rings, &c. It is found in Tartary, Persia, Siberia; in the island of Rum, Scotland, and elsewhere. It received the name heliotrope, or elitropia, because it was said that if the mineral were put into water in a basin rubbed with the juice of the plant heliotrope, and were exposed to the sun, the water would appear red and the sun blood-like, as if it was eclipsed. The stone rubbed with the juice of the plant was said to render its wearer invisible.

He'liotype, a photographic process by which pictures can be printed in the same manner as lithographs, depending on the fact that a dried film of gelatine and bichromate of potash, when exposed to light, is afterwards insoluble in water, while the portion not so exposed swells when steeped. A mixture of gelatine, bichromate of potash, chrome alum, and water is poured on a plate of glass, where it shortly settles into a film. When dried the film contracts and separates from the glass. A picture is then printed on it from a negative, after which it is attached to a plate of zinc, and copies are taken from it by inking it with lithographic ink exactly as in the ordinary lithographic process. The films are technically called 'skins.' Sometimes a gutta-percha mould is prepared from the film, and copper deposited on it by the electrotype process, the plate thus produced being printed from in the ordinary way.

Helix, (1) a spiral line as of wire in a coil, or such a curve as is described by every point of a screw that is turned round in a fixed nut. (2) In arch. a small volute or twist under the abacus of the Corinthian capital, of which in every perfect capital there are sixteen, two at each angle, and two meeting under the middle of each face of the abacus.



Helices of Corinthian Capital.

Helix, a genus of gasteropodous molluscs, comprising the land shell-snails. The common garden snail (*H. hortensis*) and the edible snail of France (*H. pomatia*) are examples.

Hell (A. Saxon, *hel*, from *helan*, to cover), signifies originally the covered or invisible place. In the English Bible the word is used to translate the Hebrew *sheol* (grave or pit) and *Gehenna* (properly the valley of *Hinnom*), as well as the Greek *Hades* (the unseen). In the Revised Version of the New Testament, however, hell is used only to translate *Gehenna*, *Hades* being left where it stands in the Greek. In common usage hell signifies the place of punishment of the wicked after death, its earlier meaning being lost. The distinctive Scripture term for the place of future punishment of the wicked is Gehenna, which, unlike Sheol and Hades, never has an intermediate signification; and Christ adopting on this point the current language of the time gave the sanction of his authority to the leading ideas involved in it. Gehenna, or hell, is with him the place of final torment. The Eastern and Western churches are at one as to the punishment of hell being partly 'a pain of loss,' that is, the consciousness of being debarred the presence of God, and partly a 'pain of sense,' that is, real physical suffering. The prevailing idea among modern theologians is that the 'fire' and the 'worm' are significant emblems to give us the most correct and living conceptions of the reality that we can possibly attain in our present circumstances.

Helladothe'rium, an extinct genus of ungulate quadrupeds allied to the existing giraffe. Fossil remains occur in the upper Miocene rocks of Attica.

Hellas, Hellenes. See *Greece*.

Hell-bender, a popular name for the Menopome (which see).

Hel'lebore (*Hellebŏrus*), a genus of plants, nat. order Ranunculaceæ, consisting of perennial low-growing plants with palmate or pedate leathery leaves, yellowish, greenish, or white flowers, having five conspicuous persistent sepals, eight to ten small tubular petals, and several many-seeded carpels. *H. orientālis* is the species which produced the black hellebore of the ancients. *H. niger*, the Christmas-rose common in gardens, is a native of South and East Europe, and is



Black Hellebore or Christmas-rose (*Hellebŏrus niger*).

the source of the black hellebore of modern pharmacopeias. *H. viridis* and *H. fœtidus* are herbaceous plants with green flowers, and grow in Britain; their leaves are emetic and purgative. The whole of these plants are accounted purgative, and in large doses act as a narcotic acrid poison; but they are now little used in medicine. *Veratrum album*, order Melanthaceæ, a very different plant, is known as white hellebore. It is extremely acrid, and in the form of powder is used to destroy caterpillars.

Hellen, in Greek myth, son of Deucalion and Pyrrha, and founder by his three sons Dorus, Æolus, and Xuthus of the four great branches of the Greek people or Hellenes.

Hellenists, a name for those Jews who, especially in Egypt after the time of Alexander the Great, became imbued with Greek culture and civilization, and spoke and wrote in Greek. To them was due the formation of the peculiar dialect termed the *Hellenistic* dialect of Greek, the special feature of which was its use of foreign, and more particularly of Hebrew and Aramaic words and idioms. The most noted of the Jewish Hellenistic philosophers was Philo of Alexandria, and the chief of the learned labours of the Alexandrian Jews was the Septuagint version of the Old Testament.

Hellespont. See *Dardanelles.*

Hellevoetsluis (hel'vut-slois), a fortified seaport of the Netherlands, prov. of South Holland, 18 miles south-west of Rotterdam, on the Haringvliet, the largest mouth of the Rhine. William III. embarked here for England in 1688. Pop. 4504.

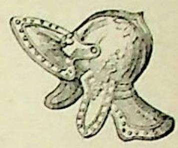
Hell Gate, a formerly dangerous pass in East River, the strait which connects New York Bay with Long Island Sound. Rocks here used to form an obstruction much dreaded by mariners, but by extensive submarine mining operations and the use of the most powerful explosives, the passage has been practically cleared.

Helm, the contrivance by which a vessel is steered, usually composed of three parts, viz. the rudder, the tiller, and the wheel, except in small vessels, where the wheel is unnecessary. See *Steering.*

Helmet, an article of armour for the protection of the head, composed of leather or of metals. Some of Homer's heroes are represented as wearing brazen helmets, with towering crests. Among the Romans the *cassis* was a metallic helmet; the *galea*, a leathern one. The earlier Greek and Roman helmets did not protect the face. During the middle ages helmets were made of steel, frequently inlaid with gold, and provided with bars and flaps to cover the face in battle and to allow of being opened at other times. The full-barred helmet entirely covered the head, face, and neck, having in



Full-barred Helmet.



Open Helmet.

front perforations for the admission of air, and slits through which the wearer might see the objects around him. The open helmet covered only the head, ears, and neck, leaving the face unguarded. Some open helmets had a bar or bars from the forehead to the chin, to guard against the transverse cut of a broadsword. The modern military helmets afford no protection for the face. Firemen wear a heavy head-piece of leather and brass, or other materials, to protect them as far as possible from falling ruins at conflagrations. Helmets of white felt, with folds of linen wrapped round them, are worn in India and other hot climates as a protection against the sun. The name helmet is also given to a kind of hat worn by policemen. In *heraldry* the helmet is borne over a coat of arms, and the form and position of it vary according to the quality or dignity of the bearer. See *Heraldry.*

Helmet-shell, the common name of molluscous shells of the genus *Cassis*, gasteropods of the family Buccinidæ. Most of the species are inhabitants of tropical shores, but a few are found on the coast of the Mediterranean. Some of the shells attain a large size. Those of *C. rufa*, *C. cornuta*, *C. tuberosa*, and other species, are the material on which shell cameos are usually sculptured.

Helmholtz, Hermann-Ludwig Ferdinand, German physiologist and physicist, born 1821 at Potsdam, and educated at Berlin. In 1848 he became professor of anatomy at the Academy of Fine Arts, Berlin, and in 1849 he obtained the chair of physiology at Königsberg, from which he was successively transferred to the same post at Bonn (1855) and at Heidelberg (1858). In 1871 he was appointed professor of physics

at Berlin. His work has been chiefly in those departments of physics which are in closest relation with physiology, notably in acoustics and optics. Of his many publications the best known are: The Conservation of Force (1847), Manual of Optics (1856–66), Popular Lectures on Scientific Subjects (London, 1873 and 1881), and Sensations of Tone as a Physiological Basis for the Theory of Music (1862, London 1875). He was ennobled by the German emperor in 1883. He died in 1894.

Helmont, JOHN BAPTIST VAN, born in 1577 at Brussels; in his seventeenth year gave public lectures on surgery at Louvain. Perceiving the defects of the system of Galen, he announced his intention of reforming medicine, but finally renounced its practice, and travelled for ten years. He was then induced by an empirical chemist to take up the study of chemistry, and his medical tastes reviving, he retired to Vilvorde, near Brussels, where he occupied himself till his death with medical labours. He boasted of having found the means of prolonging life, composed visionary theories on the constitution of man, and on diseases, and made some genuine discoveries in chemistry. He was probably the first to introduce the term *gas* into science, and was also first to observe the acid reaction of the gastric juice. The system of Van Helmont resembles that of Paracelsus, but is more clear and scientific. The emperors Rodolph II., Matthias, and Ferdinand II., invited him to Vienna, but he preferred the independence of his laboratory. He died in 1644, and his manuscripts were printed by Elzevir.

Helmstedt, or HELMSTÄDT (helm'stet), a town in Brunswick, 20 miles E.S.E. of Brunswick; formerly a member of the Hanseatic League. There are a fine church of the 12th century, and buildings in the Romanesque style, formerly accommodating a university abolished in 1809. Pop. 9800.

Helmund, a river in Afghanistan, which it traverses diagonally north-east to south-west, and ultimately falls into the extensive Lake Hamoon, after a course of about 550 miles. Its source is 11,500 feet above sea-level.

Heloder'ma, a Mexican genus of lizards, of which one species at least, *H. horridum*, has been proved to be venomous, all its teeth being furnished with poison glands. It is about 3 ft. in length, has a thick and squat body covered with rough scales, forms burrows under the roots of trees, is nocturnal in habit, and is said to feed on insects, worms, millepeds, &c.

Heloise, ELOISE (el-o-ēz), celebrated for her beauty and wit, but still more on account of her love for Abelard; was born in Paris in 1101. After the mutilation of her lover she was persuaded by him to take the veil at Argenteuil, and ultimately became prioress of the convent there until 1129, when she entered, with some of her nuns, the oratory of the Paraclete, built by Abelard at Nogent-on-the-Seine, where she lived in exemplary piety. She died in 1164. Contemporary writers speak in high terms of her genius. She understood Latin, Greek, Hebrew, was familiar with the ancients, and well read in philosophy and theology.

He'lots, slaves in ancient Sparta. They were the property of the state, which alone had the disposal of their life and freedom, and which assigned them to certain citizens, by whom they were employed in private labours. Agriculture and all mechanical arts at Sparta were in their hands, and they were also obliged to bear arms for the state in case of necessity. They behaved with great bravery in the Peloponnesian war, and were rewarded with liberty (431 B.C.), but 2000 appear to have been subsequently secretly massacred. They several times rose against their masters, but were always and finally reduced.

Helps, ARTHUR, English essayist and historian, born 1817. He graduated at Cambridge in 1835, and from 1859 until his death in 1875 was clerk of the privy-council. His works, which are for the most part of a pleasant moralizing type with many indications of a fine, if not of a robust personality, comprise an early volume of essays; Thoughts in the Cloister and the Crowd (1835); Catherine Douglas, a Tragedy (1839); Essays written during the Intervals of Business (1841); Claims of Labour (1844); the series entitled Friends in Council (1847–59); Companions of my Solitude (1851); Brevia (1871); Conversations on War (1871); Thoughts on Government (1872); Animals and Their Masters (1873); Social Pressure (1875); the Spanish Conquest of America (1855–61); Lives of Pizarro (1869) and Cortes (1871); Realmah, a Romance (1868); and Ivan de Brion, a Russian story (1874). He also edited the Prince Consort's Speeches (1862), and the Queen's Leaves from a Journal (1868), receiving knighthood shortly before his death.

Helsingborg, a seaport in Sweden, at the narrowest part of the Sound, opposite Elsinore. It has manufactures of leather, dye-works, tile-works, salt-works, and a spacious harbour. Pop. 21,681.

Helsingfors, a seaport of Russia, capital of Finland, on a peninsula in the gulf of that name, 180 miles W.N.W. St. Petersburg. Helsingfors is the residence of the governor, the seat of important courts and public offices, and contains a university, removed from Åbo in 1827. It has manufactures of linen, sail-cloth, and tobacco, an important trade in timber, corn, and fish, and one of the best harbours in the Baltic. Pop. 65,536.

Helsingör. See *Elsinore.*

Helst, BARTHOLOMEW VAN DER, a most distinguished Dutch portrait-painter, born at Haarlem in 1611 or 1612. His picture of a banquet of a company of the civic guard in the Stadthouse at Amsterdam was called by Sir Joshua Reynolds 'perhaps the first picture of portraits in the world.' He died at Amsterdam (where he had long re-resided) in 1670.

Helston, a municipal, and until 1885 parl. borough of England, county of Cornwall, on an acclivity on the left bank of the Cober, 9 miles S.W. Falmouth. Principal industries, mining and shoemaking, and there is some shipping trade from Port Leven, 3 miles distant. Pop. mun. bor. 3198.

Helvel'lyn, one of the highest mountains of England, county of Cumberland, between Keswick and Ambleside; height, 3313 feet.

Helvetian Republic, the name given to the republic established in Switzerland by the French in 1798. See *Switzerland.*

Helvet'ic Confession, the name of a document drawn up by Martin Bucer in 1536 to settle the controversy between the Lutherans and the Zwinglians; and also of one drawn up by Bullinger (1566) at the request of Friedrich III., elector of the Palatinate, and adopted in Switzerland, the Palatinate, France, Hungary, Poland, and Scotland.

Helve'tii, anciently a Gallic or Celtic nation, dwelling in the country now nearly corresponding with Switzerland. They were not much known to the Romans until the time of Julius Cæsar, who, as governor of Gaul, prevented their intended emigration, and after many bloody battles pressed them back within their frontiers. After their subjection by Cæsar several Roman colonies were established amongst them. On the death of Nero the Helvetii, for refusing to acknowledge Vitellius as emperor, were mercilessly punished by Cæcina, one of his generals, and thenceforth almost disappear as a people.

Helvétius (el-vā-si-ūs), CLAUDE ADRIEN, French philosophical writer, born in 1715. Having made a fortune as a farmer-general, he devoted himself to philosophic work. In 1758 he published his one important book, De l'Esprit (On the Mind), the materialism of which drew upon him many attacks. It was condemned by the Sorbonne, and publicly burned by decree of the Parliament of Paris. In 1764 he went to England, and the year afterwards to Germany, where Frederick the Great and other German princes received him with many proofs of esteem. He died in 1771 in Paris. He also wrote a work, De l'Homme, and an allegorical poem, Le Bonheur.

Helvoetsluis (hel'vụt-slois). See *Hellevoetsluis.*

He'mans, FELICIA DOROTHEA, English poetess, born at Liverpool in 1794; maiden name Brown. She first appeared as an authoress in 1808, with a volume entitled Early Blossoms, which was followed in 1812 by her more successful volume, The Domestic Affections. In the same year she married Captain Hemans, who, however, left her six years later, shortly before the birth of her fifth son. She then devoted herself to literature, winning public notice by her poems entitled The Restoration of the Works of Art to Italy, The Sceptic, Modern Greece, and Dartmoor, the last, in 1821, gaining the prize of the Royal Society of Literature. In 1825 she took up her residence at Rhyllon, near St. Asaph, where she wrote her Lays of Many Lands, Forest Sanctuary, and Records of Woman. In 1828 she changed her residence to Wavertree, near Liverpool, where, in 1830, she published one of her most popular volumes, entitled The Songs of the Affections. In 1831 she removed to Dublin, where she published her Hymns for Childhood, National Lyrics and Songs for Music, and Scenes and Hymns of Life. Her death took place in 1835. Her poetry is essentially lyrical and descriptive, and is always sweet, natural, and pleasing. In her earlier pieces she was imitative, but she ultimately asserted her independence, and produced many short poems of great beauty and pathos, and evidently destined to live.

Hem'atine, or HÆMATINE, the red colouring matter of the blood occurring in solution in the interior of the blood corpuscles or cells. It is the only structure of the body, except hair, which contains iron.

Hem'atite, a name applied to two ores of iron, red hematite and brown hematite. They are both of a fibrous structure, and the fibres, though sometimes nearly parallel, usually diverge or even radiate from a centre. They rarely occur amorphous, but almost always in concretions, reniform, globular, botryoidal, stalactitic, &c. The red hematite is a variety of the red oxide, and is one of the most important iron-ores. The brown hematite is a variety of the brown oxide or hydrate; its streak and powder are always of a brownish yellow. See *Iron*.

Hematoxylin. See *Hæmatoxylin.*

Hemeralo'pia, a defect in the sight in consequence of which a person can see only by artificial light; day blindness. It is also used, however, for exactly the opposite defect of vision. See *Nyctalopia.*

Hemerobi'idæ, the lace-wing flies, a family of neuropterous insects.

Hemerocal'lis, a genus of Liliaceæ. See *Day-lily.*

Hemides'mus, a genus of twining plants, nat. order Asclepiadaceæ, having opposite leaves, and cymes of small greenish flowers. *H. indicus* yields the Indian sarsaparilla, a reputed alterative, diuretic, and tonic, which is rarely employed in England.

Hemimetab'ola, the section of the class Insecta which undergo an incomplete metamorphosis, the larva differing from the perfect insect chiefly in the absence of wings and in size.

Hemio'pia, a defect of vision in which the patient sees only a part of the object he looks at, the middle of it, its circumference, or its upper or lower part, or more commonly one lateral half being completely obscured.

Hemiple'gia, HEMIPLEGY, a paralysis affecting one-half of the body.

Hemipo'dius, a genus of rasorial birds allied to the quails. The swift-flying hemipodius is the little quail of New South Wales.

Hemip'tera, an order of four-winged insects, having a suctorial proboscis, the outer wings, or wing-covers, either entirely formed of a substance intermediate between the elytra of beetles and the ordinary membranous wings of most insects, or leathery at the base and transparent towards the tips (*hemelytra*). In one group (Aphides) all the wings when present are membranous. The true wings are straight and unplaited. Some feed on vegetable and some on animal juices. Those having the upper wings of a uniform substance throughout (whether leathery or transparent) have been constituted into a section, and by some naturalists into an order named Homoptera; those having them partly leathery and partly transparent constitute the section or order Heteroptera. To the Hemiptera belong the plant-lice, boat-fly, cochineal insect, locust, bug, lantern-fly, &c.

Hem'isphere, half a sphere, especially one of the halves into which the earth may be supposed to be divided. It is common to speak of the Eastern Hemisphere and the Western Hemisphere, the former, also called the Old World, comprising Europe, Asia, Africa, Australia, &c.; the latter, North and South America, &c. The boundary between the two is quite arbitrary, and a more natural division of the earth is into the northern and the southern hemisphere, the equator forming the dividing line.

Hemlock, a poisonous plant, *Conium maculātum*, nat. order Umbelliferæ, supposed to be identical with the plant *kōneion* of the Greeks. It is a tall, erect, branching biennial, with a smooth, shining, hollow stem, usually marked with purplish spots, elegant, much-divided leaves, which when bruised emit a nauseous odour, and white flowers in compound umbels of ten or more rays, surrounded by a general involucre of three to seven leaflets. It is found in Britain and throughout Europe and temperate Asia in waste places, banks, and under walls. It is said to be fatal to cows when they eat it, but that horses, goats, and sheep may feed upon it without danger. In the human subject it causes paralysis, convulsions, and death. The poison administered to Socrates is supposed to have been a decoction of it, though others are of opinion that the potion was obtained from water-hemlock (*Cicūta virōsa*). Hemlock is a powerful sedative, and is used medicinally.



Hemlock (*Conium maculātum*).

The extract is considered the best preparation. It is often serviceable as a substitute for, or an accompaniment to opium. It has been found very useful in chronic rheumatism and in hooping-cough, in allaying the pain of irritable sores and cancerous ulcers. The virtues of hemlock reside in an alkaline principle termed *conia* or *coniine*.

Hemlock, or HEMLOCK SPRUCE, a name given to an American fir (*Abies canadensis*) from its branches resembling in tenuity and position the common hemlock.

Hem'orrhage, a flux of blood from the vessels containing it, whether from a rupture or any other cause. A hemorrhage from the lungs is called *hemoptysis;* from the urinary organs, *hematuria;* from the stomach, *hematemesis;* from the nose, *epistaxis;* the treatment of course varying with the cause and seat of the mischief.

Hem'orrhoids, signifying an affection of the rectum, otherwise called *piles*. In general, hemorrhoids manifest themselves between the period of puberty and old age, although infants and aged people are not entirely exempt from attacks. In some cases they appear to be the effect of a certain hereditary disposition, but any circumstance which produces a tendency or stagnation of the blood at the extremity of the rectum is to be reckoned among the local causes. The accumulation of fecal matter in the intestines, efforts to expel urine, the obstruction of any of the viscera, especially of the liver, the frequent use of hot bathing, of drastic purges, long continuance in a sitting posture, riding on horseback, pregnancy —such are some of the ordinary causes of hemorrhoids. They are distinguished into several sorts, as external, when apparent at the anus; internal, when concealed within the orifice; blind or open, regular or irregular, active or passive, periodical or anomalous, &c. The best mode of treatment is to recur to hygienic rather than medicinal influences. The subject should avoid violent exercise; the food should not be too stimulating or nutritious. Travelling, or an active life, should succeed to sedentary habits. Constipation should be remedied by laxatives or gentle purgatives. Anything which may be productive of a local heat should be avoided; as warm seats, soft beds, too much sleep. If the pain is considerable recourse should be had to sedatives, gentle bleeding, leeches. The use of suppositories containing drugs, such as tannic acid or extract of witch-hazel (hazeline), will be found very useful; in mild cases iodoform suppositories may be curative. If the disease appears under a more severe form a surgical operation may become necessary.

Hemp (*Cannăbis satīva*), a plant, the only known species of the genus *Cannăbis*, nat. order Cannabinaceæ. It is an annual herbaceous plant; the leaves are divided into five lanceolate and coarsely serrate leaflets; the male flowers, which are on separate stems, are green, resembling those of the hop; the female flowers are inconspicuous, and the fruit is a little hard capsule containing a single seed. It is a native of Western and Central Asia, but has long been naturalized in Brazil and tropical Africa, and is extensively cultivated in Italy and many other European countries, particularly Russia and Poland. The Indian variety, often known as *Cannăbis indica*, is the source of the narcotic drug variously known as *hashish*, *bhang*, or *gunjah*. The hemp fibre is tough and strong, and peculiarly adapted for weaving into coarse fabrics such as sail-cloth, and for twisting into ropes and cables. Immense quantities are exported from Russia. The finer sorts are used for shirtings, sheetings, &c., which, though coarser than that made from flax, are very much stronger and equally susceptible of being bleached. The hemp of England is very superior, but the plant does not pay the farmer, and very little of it is grown. In some of the United States it is a crop of considerable importance. The seed must be sown thin, not more than 1 to 2 bushels to an acre. Small paths are often left open along the field lengthwise, at about 7 feet distant from each other, to allow the plucking of the male plants first, as the female require to remain standing a month longer to admit of the seed becoming ripe. But in some parts the whole crop is cut at once, plants for seed being separately cultivated. The plant being stripped of its leaves, and dried in the open air, may be stored, but when steeped green it turns out of a better colour. The steeping takes from four to eleven days, and the operation is known to be completed by the inner *reed* or woody fibre separating easily from the



Hemp (*Cannăbis satīva*).

fibres of the outer bark. When thoroughly steeped it is taken out of the water and spread out in rows on the grass to bleach. This takes three weeks or more, during which period it requires constant turning with a light, long pole. After drying it is scutched or broken by breaks and scutching-stocks, resembling those employed for flax. Beating is the next operation, which separates the 'boon' from the fibre. The hemp is now ready for being heckled, after which it may be spun. Hemp-seed is much used as food for cage-birds, and also yields an oil. Sisal hemp or 'henequen' and Manilla hemp are not true hemps.

Hemp, African. See *Bowstring Hemp*.

Hemp-agrimony. See *Eupatorium*.

Hemp-nettle, the English name for Galeopsis (which see).

Hemp-palm, a Chinese and Japanese species of palm (*Chamærops excelsa*), of the fibres of whose leaves cordage is made, while hats and even cloaks are made from the leaves themselves.

Hems, or Homs (Roman, *Emesa*), a town of Syria, 85 to 90 miles north-east of Damascus. It is fortified, and has an active trade. The plains of Hems were the scene of the defeat of Zenobia by Aurelian in 272 A.D.; and of the defeat of the forces of the sultan of Turkey by Ibrahim Pasha in 1832. Pop. 30,000.

Henbane, a plant of the genus *Hyoscyămus*, nat. order Solanaceæ. The only British species is *H. niger*, a native of Europe and Northern Asia. It is a coarse erect biennial herb, found in waste ground and loose dry soil, having soft, clammy, hairy foliage of disagreeable odour, pale yellowish-brown flowers streaked with purple veins, and a five-toothed calyx. The expressed juice of the leaves and seeds is often used as a sedative, antispasmodic, and narcotic, having in many cases the great advantage over laudanum of not producing constipation. When taken in considerable quantity it proves quickly fatal to man and most animals, particularly to domestic fowls, whence the name. Called also *Stinking Nightshade*.



Henbane (*Hyoscyamus niger*).

Henequen (en-e-ken'), the Mexican name for *sisal* or grass hemp (*Agăve sisalāna*), a native of Mexico and Central America, which yields a strong fibre made into cordage and cloth. The cultivation of the plant in Yucatan and its exportation have immensely increased in recent years.

Henfish, the young of the whiting-pout (*Morrhua lusca*).

Hengist, a prince of the Jutes, founder of the Kingdom of Kent in Great Britain, in conjunction with his brother Horsa. In 449 the Britons sued for aid from the Saxons against the inroads of the Scots and Picts. The Saxons under Hengist and Horsa accordingly landed at the mouth of the Thames, and defeated the northern tribes near Stamford in 450 A.D. Being reinforced from home they afterwards united with the Scots and Picts against the Britons, whom they ultimately dispossessed. Hengist, who had lost his brother in the battle near Eglesford (now Ailsford) in 445 A.D., founded the Kingdom of Kent, established his residence in Canterbury, and died about the year 488. By some recent writers the brothers are, with insufficient reason, regarded as mythical personages.

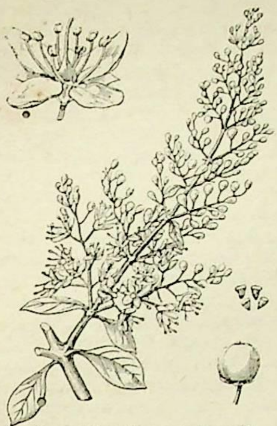
Hengstenberg, Ernst Wilhelm, German divine and commentator, born in 1802, and long professor of Old Testament exegesis at the University of Berlin. He died in 1869. His influence as leader of the orthodox party was established by the publication of the Evangelische Kirchenzeitung (1827), of which he was editor, and which had for contributors Otto and Ludwig von Gerlach, Neander, Tholuck, Lange, Huber, Stahl, Vilmar, and Leo. His works include a translation of Aristotle's Metaphysics; a Christology of the Old Testament, and Introduction to the Old Testament; a Commentary on the Psalms, the Revelation of St. John; a History of the Kingdom of God in the Old Testament, &c.

Hen-harrier, a species of hawk of the genus *Circus*, *C. cyaneus*. See *Harrier*.

Henley-on-Thames, a municipal borough of England, in Oxfordshire, on the left bank of the Thames, here crossed by a handsome bridge, 35 miles w. of London, giving name to a parl. div. Pop. 4913.

Henna, a shrub (*Lawsonia inermis*), nat. order Lythraceæ, bearing opposite entire leaves and numerous small white fragrant

flowers disposed in terminal panicles. Externally it bears considerable resemblance to the European privet. It grows in moist



Henna Plant (*Lawsonia inermis*).

situations throughout North Africa, Arabia, Persia, and the East Indies, and has acquired celebrity from being used by the inhabitants of those countries to dye yellow the nails of their fingers and the manes, hoofs, &c., of their horses. It is cultivated extensively in Egypt, and the powdered leaves form a large article of export to Persia and the Turkish possessions. It may be used for dyeing woollens, not only yellow, but brown, when alum and sulphate of iron are employed.

Hennebont (en-boṉ), an ancient seaport, France, dep. of Morbihan, on the Blavet, 27 miles W.N.W. of Vannes. Pop. 5498.

Hennegau (hen'e-gou), German name of Hainaut.

Henrietta Maria, queen of Charles I. of England; youngest child of Henry IV. of France, by his second wife, Maria de' Medici; born in Paris 1609. The proposed marriage between Charles, Prince of Wales, and the Infanta of Spain having failed, a matrimonial negotiation was opened with Henrietta, whom he had first met at a ball in Paris while on his way to Spain. The marriage was celebrated by proxy at Paris in 1625, but her first popularity in England was soon destroyed by her bigotry, hauteur, and despotic ideas as to divine right. Much of the subsequent procedure which brought Charles to the block may be traced indirectly to her influence. On the breaking out of civil war she proceeded to Holland, procured money and troops, and afterwards joined Charles at Oxford. She again went to the Continent in 1644, and resided in France till the Restoration. On that occasion she visited England, but soon returned to France, and died near Paris in 1669.

Henry I. of Germany, surnamed *The Fowler*, according to tradition because his election to the German empire was announced to him while fowling; born in 876; the son of Otho the Illustrious, duke of Saxony. Henry, on the death of his father, became Duke of Saxony and Thuringia. He was elected emperor of Germany in 919, and was the true founder of the empire. By his prudence and activity Suabia and Bavaria were forced to tender allegiance, and Lorraine was reunited to the German Empire in 925. He was defeated, however, by the Hungarians, and forced to pay a yearly tribute to obtain a truce for nine years. He spent this period in developing a sound military organization, and turning his arms against various Slavonic tribes in the south, was everywhere victorious. At the end of the truce with the Hungarians he refused the tribute, and completely routed them in 933. Besides his military reforms he diminished the feudal privileges, and granted to



Henrietta Maria.

the cities of the empire their first municipal charters. He died in 936.

Henry II., THE SAINT, Emperor of Germany, born 972, was a son of Henry the Quarreller of Bavaria, and great-grandson of the Emperor Henry I. He inherited

Bavaria in 995, and on the death of Otho III. in 1002 laid claim and was elected to the empire. He had to proceed to Italy to assert his sovereignty there, the Lombard cities having chosen Harduin of Ivrea as their king. During his absence Boleslas of Poland extended his sway over the whole of Bohemia, but after repeated campaigns Henry succeeded in recovering Bohemia, and in 1018, in the Peace of Budissin (Bautzen), reduced him to complete subjection. In the midst of these campaigns against Boleslas he made another expedition into Italy (1013) against Harduin. On this occasion Henry was crowned emperor by Pope Benedict VIII. He made a third expedition into Italy in 1022 to aid Benedict against the Greeks. He died in 1024.

Henry III., Emperor of Germany, the second belonging to the house of the Salian Franks, son of the Emperor Conrad II.; born in 1017; chosen king in 1026; succeeded his father in the imperial dignity 1039. He weakened the power of the great feudal lords; and forced the Duke of Bohemia in 1042, and the king of Hungary in 1044, and again in 1047, to accept their dominions as imperial fiefs. His influence was also paramount in Italy, especially in Milan, and in the south, where the Normans in Apulia and Calabria paid him homage. In 1046 he deposed the rival popes Benedict IX., Sylvester III., and Gregory IV., and caused Suitger, bishop of Bamberg, to be elected in their stead as Clement II. His efforts to secure the permanence of the influence of the empire over the see of Rome were thwarted by Cardinal Hildebrand (Gregory VII.). He died in 1055. His first wife was a daughter of Canute the Great of England.

Henry IV., German emperor, son of Henry III., was born in 1050, and at the death of his father was only five years old. His whole life was a series of troubles, partly of his own causing. His severe treatment of the Saxons led to a rising which was cruelly punished. His treatment of the conquered people was such that they complained to the pope, and Gregory VII. (Hildebrand), accordingly summoned Henry, in 1076, to appear before him at Rome and answer the charges, at the same time forbidding the sale of ecclesiastical dignities. Henry not only disregarded the threat, but instigated the bishops, assembled by his order at Worms, to renounce their obedience to the pope. Gregory, however, pronounced sentence of excommunication against him, and Henry, finding himself deserted, was obliged to go to Italy and make his submission to the pope (1077). The insolence with which the pope used his victory produced a reaction; the Italian princes, who had long been dissatisfied with Gregory, offered Henry their assistance. The German princes, however, at the instigation of the pope, elected Rudolph, duke of Suabia, king. Henry hastened back to Germany and overcame his rival, who lost his life in 1080. Gregory again excommunicated Henry; but at the Council of Brixen, in 1080, he was deposed by the German and Italian bishops as a heretic and a sorcerer, and Guibert, archbishop of Ravenna (Clement III.) set up in his place. In 1084 Henry succeeded in establishing Clement at Rome, but was obliged to return to Germany to maintain his ground against two rivals who successively arose. In 1085 Henry was again obliged to cross the Alps in aid of his protégé Clement III. But the dissatisfaction against him in Germany had not subsided, and though he succeeded in crushing the rebellion of his eldest son, Conrad, who died deserted at Florence in 1101, his second son Henry made himself master of his father's person in 1105 by stratagem, and compelled him to abdicate the throne at Ingelheim. Henry IV. ended his life and his sorrows in neglect at Liége in 1106.

Henry V., Emperor of Germany, the son and successor of Henry IV. (see above), was born in 1081. On his ascension the question of investiture distracted the empire anew. Pope Pascal would only confer the imperial crown upon condition that the rights claimed by Gregory should be formally conceded. Henry therefore seized the pope at the altar, and imprisoned him until he yielded two months later, and crowned Henry in April 1811. Disturbances, however, arose in Germany, especially with Lothaire of Saxony, and the pope, declaring that his peace with the emperor had been compulsory, fomented the strife. The war continued two years, and devastated Germany, and after a second expedition to Italy and excommunication by successive popes, Henry was compelled to yield in the matter of investiture, and in 1122 subscribed the Concordat of Worms. He died at Utrecht in 1125, and was the last of the Salic or Frankish family of emperors, which was succeeded by the Suabian house. He married

Matilda, a daughter of Henry I. of England.

Henry VI., German emperor, son of Frederick I. and Beatrice of Burgundy, the third emperor of the house of Hohenstaufen, born in 1165, crowned king in 1169, succeeded his father as emperor in 1190. He kept Richard Cœur de Lion in prison, and obtained a large ransom for him. He died in 1197.

Henry VII., Emperor of Germany, born in 1262, was chosen emperor in 1308. Among the first acts of his reign were recognition of the independence of the Swiss cantons of Schwyz, Uri, and Unterwalden, and the granting of the Kingdom of Bohemia to his son John. He compelled the Milanese to give him the iron crown of Lombardy, suppressed by force the revolt which then broke out in Upper Italy, captured part of Rome, which was in the hands of Neapolitan troops, and was crowned Roman Emperor by two cardinals. He died suddenly in 1313.

Henry II., King of France, born in 1519, succeeded his father, Francis I., in 1547. Throughout his reign his mistress, Diana of Poitiers, exercised an important influence over king and court. After a brief war with England for the recovery of Boulogne, a war of longer duration and more serious results originated in 1551 in disputes between Henry and the pope as to the duchies of Parma and Placentia, and continued to devastate Europe till the general peace of Câteau-Cambrésis, 1559. To confirm the peace Philip II., become a widower by the death of Mary of England, was to marry Elizabeth, Henry's eldest daughter by Catharine de' Medici. In the course of a tourney held to celebrate the event, Henry was mortally wounded by a splinter from the lance of Lord Montgomery, captain of the Scottish guard. He was succeeded in 1559 by his eldest son, Francis II.

Henry III., King of France, third son of Henry II. and Catharine de Medici, born in 1551; succeeded his brother, Charles IX., in 1574. In the previous year he had been chosen king of Poland, which he was obliged to quit secretly when called to the throne of France. In 1576, after a civil war, he granted to the Protestants the favourable edict of Beaulieu, but the concession led to the formation of the League, and Henry, to re-establish his authority, declared himself its head. Civil war, however, again broke out, and though hostilities were again put an end to by the Peace of Bergerac in 1577, they were renewed in 1580 until the Peace of Fleix (Nov. 1580). The death of his brother the Duc d'Anjou in 1584, which left Henry of Navarre, a Calvinist, heir-apparent to the throne, brought on another war, called the war of the Three Henries, the leading persons engaged in it besides the king being Henry of Guise, the real head of the League, and Henry of Navarre. In 1588 Henry of Guise expelled the king from his capital. An apparent reconciliation at Blois was followed by the assassination of the Guises, and Henry, finding himself everywhere opposed by the Catholic party, was compelled to ally himself with Henry of Navarre. The two princes advanced on Paris, but in 1589 Henry III. was stabbed by Jacques Clement, a Dominican, and died next day. He was the last of the branch of Orléans-Angoulême of the stock of the Valois, and was succeeded by Henry of Navarre, the first of the house of Bourbon.

Henry IV. of France was son of Anthony of Bourbon, duke of Vendôme, and of Jeanne d'Albret, daughter of Henry, king of Navarre, and herself afterwards queen of Navarre. He was born in Dec. 1553, at Pau. Educated by his mother in the Calvinistic faith, he early joined, at her wish, the Protestant army of France, and served under Admiral Coligny. In 1572 he married Margaret of Valois, sister of Charles IX., and after the massacre of St. Bartholomew, which took place during the marriage festivities, was forced to adopt the Catholic creed. In 1576 he escaped from Paris, retracted at Tours his enforced abjuration of Calvinism, put himself at the head of the Huguenots, and took a leading part in all the subsequent religious wars. On becoming presumptive heir to the crown in 1584 he was obliged to resort to arms to assert his claims. In 1587 he defeated the army of the League at Coutras, and after the death of Henry III. gained the battles of Arques (1589) and Ivri (1590). He was obliged, however, to raise the siege of Paris; and convinced that a peaceful occupation of the throne was impossible without his professing the Catholic faith, he became nominally a Catholic in 1593. After his formal coronation in 1594 only three provinces held out against him—Burgundy, reduced by the victory of Fontaine-Française in 1595; Picardy, reduced by the capture of Amiens in 1596; and Brittany, which came into his

hands by the submission of the Duke of Mercœur in the spring of 1598. The war against Spain was concluded in 1598 by the Peace of Vervins to the advantage of France. The same year was signalized by the granting of the edict of Nantes, which secured to the Protestants entire religious liberty. He made use of the tranquillity which followed to restore the internal prosperity of his kingdom, and particularly the wasted finances, in which he was successful with the aid of his prime-minister Sully. At the instance of Sully Henry divorced Margaret of Valois, and in 1600 married Maria de' Medici, niece of the Grand-duke of Tuscany, mother of Louis XIII. She was crowned at St. Denis in 1610, but on the following day Henry was stabbed by a fanatic named Ravaillac, while examining the preparations for the queen's entry into Paris. The great benefits which Henry IV. bestowed upon France entitle him to the designation which he himself assumed at an assembly of the Notables at Rouen in 1596, the Regenerator of France (*Restaurateur de la France*).

Henry I., King of England, surnamed *Beauclerc* ('fine scholar'), youngest son of William the Conqueror, was born at Selby in Yorkshire, in 1068. He was hunting with William Rufus when that prince was killed, in 1100, and instantly riding to London, caused himself to be proclaimed king, to the prejudice of his elder brother Robert, then absent as a Crusader. He re-established by charter the laws of Edward the Confessor, recalled Anselm to the primacy, and married Matilda, daughter of Malcolm III. of Scotland, thus conciliating in turn the people, the church, and the Scots. Robert landed an army, but was pacified with a pension, and the promise of succession in event of his brother's decease. Soon after, however, Henry invaded Normandy, took Robert prisoner in 1106, and reduced the duchy. He was successful also in the struggle with France. The last years of his reign were very troubled. In 1120 his only son William was drowned in returning from Normandy, where, three years later, a revolt occurred in favour of Robert's son. The Welsh also were a source of disturbance. Henry appointed as his heir his daughter Matilda or Maud, whom he had married first to the Emperor Henry V., and then to Geoffrey Plantagenet of Anjou. Henry died at Rouen in 1135, and was succeeded by Stephen.

Henry II., King of England, first of the Plantagenet line, born in Normandy in 1133, was son of Geoffrey, count of Anjou, and Matilda, daughter of Henry I. He was invested with the Duchy of Normandy, by the consent of his mother, in 1150; in 1151 he succeeded to Anjou and Maine, and by a marriage with Eleanor of Guienne gained Guienne and Poitou. In 1152 he invaded England, but a compromise was effected, by which Stephen was to retain the crown, and Henry to succeed at his death, which took place in 1154. The commencement of his reign was marked by the dismissal of the foreign mercenaries; and although involved with his brother Geoffrey, who attempted to seize Anjou and Maine, and in a temporary dispute with France, he reigned prosperously till the contest with Thomas Becket regarding the Constitutions of Clarendon. Although sufficiently submissive after Becket's death in the way of penance and expiation, Henry only gave up the article in the Constitutions of Clarendon which forbade appeals to the court of Rome in ecclesiastical cases. Before this matter was terminated, Henry, in 1171, completed the conquest of Ireland, a great part of which had been reduced by Richard de Clare, earl of Pembroke, commonly known as Strongbow. Henry's last years were embittered by his sons, to whom he had assigned various territories. The eldest son, Henry, who had been not only declared heir to England, Normandy, Anjou, Maine, and Touraine, but actually crowned in his father's lifetime, was induced by the French monarch to demand of his father the immediate resignation either of the kingdom of England or of the dukedom of Normandy. Queen Eleanor excited her other sons, Richard and Geoffrey, to make similar claims; Louis and William of Scotland gave them support; and a gen-


Henry II., from his tomb.

eral invasion of Henry's dominions was begun in 1173 by an attack on the frontiers of Normandy, and an invasion of England by the Scots, attended by considerable disturbance in England. Conciliating the church by his penance, Henry took prompt action; William of Scotland was captured, and an accommodation arrived at with Henry's sons. These, however, once more became turbulent, and though the deaths of Henry and Geoffrey reduced the number of centres of disturbance, the king was forced to accept humiliating terms from Richard and Philip of France. He died shortly after at Chinon in 1189. He ranks among the greatest English kings both in soldiership and statecraft. He partitioned England into four judiciary districts, and appointed itinerant justices to make regular excursions through them; revived trial by jury, discouraged that by combat, and demolished all the newly erected castles as 'dens of thieves.'

Henry III., King of England, son of John by Isabel of Angoulême; born at Winchester in 1207; succeeded his father in 1216. At the time of his accession the dauphin of France, Louis, at the head of a foreign army, supported by a faction of English nobles, had assumed the reins of government; but was compelled to quit the country by the Earl of Pembroke, who was guardian of the young king until 1219. As Henry approached to manhood he displayed a character wholly unfit for his station. He discarded his most able minister Hubert de Burgh, and after 1230, when he received homage in Poitou and Gascony, began to bestow his chief favours upon foreigners. His marriage in 1236 with Eleanor of Provence, increased the dislike to him felt by his subjects, and although he received frequent grants of money from parliament, on condition of confirming the Great Charter, yet his conduct after each ratification was as arbitrary as before. At length the nobles rose in rebellion under Simon de Montfort, earl of Leicester and husband of the king's sister; and in 1258, at a parliament held at Oxford, known in history as the Mad Parliament, obliged the king to sign the body of resolutions known as the Provisions of Oxford. A feud arose, however, between Montfort and Gloucester, and Henry recovered some of his power. War again broke out, and Louis was called in as arbitrator, but his award being favourable to the king, Leicester refused to submit to it. A battle was fought near Lewes, in which Henry was taken prisoner. A convention, called *the Mise of Lewes*, provided for the future settlement of the kingdom; and in 1265 the first genuine House of Commons was summoned. Leicester, however, was defeated and slain in the battle of Evesham (1265), and Henry was replaced upon the throne. He died in 1272. His son Edward I. succeeded him.

Henry IV., King of England, first king of the house of Lancaster; born in 1366; was eldest son of John of Gaunt, duke of Lancaster, third son of Henry III. by the heiress of Edmund, earl of Lancaster, second son of Henry III. In the reign of Richard II. he was made Earl of Derby and Duke of Hereford, but having in 1398 preferred a charge of treason against Mowbray, duke of Norfolk, he was banished with his adversary. On the death of John of Gaunt in 1399 Richard withheld Henry's inheritance, and Henry, landing in England, gained possession of Richard's person. The deposition of Richard by parliament, and the election of Henry, was followed by the murder of the late king. A plot against the king in 1400 was discovered in time to prevent its success, and many executions of men of rank followed; but an insurrection in Wales under Owen Glendower proved more formidable. The Scots were decisively defeated by the Percies at Homildon, and their leader, the Earl of Douglas, was captured (1402). An order from Henry not to permit the ransom of that nobleman and other Scottish prisoners was regarded as an indignity by the Percies, who set Douglas free, made an alliance with him, and joined Glendower. The king met the insurgents at Shrewsbury (1403), the battle ending in the defeat and death of Percy. The Earl of Northumberland was pardoned, and but few victims were executed. A new insurrection, headed by the Earl of Nottingham and Scrope or Scroop, archbishop of York, broke out in 1405, but was suppressed by the king's third son, Prince John. The rest of this king's reign was comparatively untroubled. In 1405 James, son and heir to King Robert of Scotland, was captured at sea on his way to France, and was detained a prisoner in England. Henry died in 1413, and was succeeded by Henry V.

Henry V., King of England, born at Monmouth in 1388. On succeding his father, Henry IV., in 1413, he showed a wisdom in marked contrast to a somewhat reckless youth. He restored their estates

to the Percies, and liberated the Earl of March, but in other respects based his internal administration upon that of his father. The persecution of the Lollards is the chief blot upon the early part of his reign. The struggle in France between the factions of the Dukes of Orleans and Burgundy afforded Henry a tempting opportunity for reviving the claims of his predecessors to the French crown. He accordingly landed near Harfleur in August, 1415, and though its capture cost him more than half his army he decided to return to England by way of Calais. A large French army endeavoured to intercept him at the plain of Agincourt, but was completely routed (October, 1415). A year later the French were defeated at sea by the Duke of Bedford. In 1417 the liberal grants of the Commons enabled Henry once more to invade Normandy with 25,000 men. The assassination of the Duke of Burgundy, which induced his son and successor to join Henry, greatly added to his power, and the alliance was soon followed by the famous Treaty of Troyes (May 21, 1420), by which Henry engaged to marry the Princess Catharine, and to leave Charles VI. in possession of the crown, on condition that it should go to Henry and his heirs at his decease. He returned in triumph to England, but on the defeat of his brother, the Duke of Clarence, in Normandy by the Earl of Buchan, he again set out for France, drove back the army of the dauphin, and entered Paris. A son was at this time born to him, and all his great projects seemed about to be realized, when he died of fever at Vincennes in August, 1422, at the age of thirty-four, and in the tenth year of his reign. He was succeeded by his son Henry VI.

Henry VI., King of England, born at Windsor in 1421, was crowned at Westminster in 1429, at Paris in 1430. As he was an infant not nine months old at the death of his father Henry V., his uncle John, duke of Bedford, was appointed regent of France; and his uncle Humphrey, duke of Gloucester, made protector of the realm of England. A few weeks after Henry's succession Charles VI. of France died, when, in accordance with the Treaty of Troyes, Henry was proclaimed king of France. The war which followed at first proved favourable to the English, but in the end, by the heroism of Joan of Arc, the death of the Duke of Bedford, and the defection of the Duke of Burgundy, resulted in the loss to the English of all their possessions in France except Calais. In April, 1445, Henry married Margaret of Anjou, daughter of René of Provence. Two years later Humphrey of Gloucester died, when the Earl of Suffolk acquired the chief power in the kingdom, but his government was very unpopular. The insurrection of Cade followed, and the Duke of York returning from Ireland, a great party was formed in his favour, and he was declared by parliament protector of the kingdom, the imbecile Henry being by this time unable even to personate majesty. The appointment was annulled in the following year, the king having recovered his faculties. York retired to the north, and being joined by his adherents, marched upon London. He encountered and defeated the king's army at St. Albans (1455), the first battle of the thirty years' wars of the Roses. The king again becoming deranged, York was once more made protector. Four years of peace followed, but the struggle was soon renewed. The king's forces were beaten at Blore Heath and Northampton, and though they gained the Battle of Wakefield, at which York was killed, they were again defeated by his son Edward at Towton and Hexham. Henry was restored for a few months in 1471 by Warwick, 'the king-maker,' but the battles of Barnet and Tewkesbury proved the hopelessness of his cause, and he died, some say was murdered, a few days after the last battle, in May, 1471. He was a gentle, pious, well-intentioned, hopelessly incompetent king, whose best reputation is that of founder of Eton College and King's College, Cambridge.

Henry VII., King of England, first sovereign of the race of Tudor, born in 1456. He was the son of Edmund, earl of Richmond, son of Owen Tudor and Catharine of France, widow of Henry V. His mother, Margaret, was the only child of John, duke of Somerset, grandson of John of Gaunt. After the battle of Tewkesbury he was carried by his uncle, the Earl of Pembroke, to Brittany, and on the usurpation of Richard III. was naturally turned to as the representative of the house of Lancaster. In 1485 he assembled a small body of troops in Brittany, and having landed at Milford Haven, defeated Richard at Bosworth, and was proclaimed king on the field of battle, his right being subsequently recognized by parliament. In 1486 he married Elizabeth, daughter of Edward IV. and heiress of the house of York, and thus united the claims

of the rival houses of York and Lancaster. The reign of Henry VII. was troubled by repeated insurrections, of which the chief were that headed by Lord Lovel and the Staffords (1486), and the impostures of Lambert Simnel (1487) and Perkin Warbeck (1496–99). He brought about a match between the Infanta Catharine, daughter of Ferdinand of Aragon and of Isabella of Castile, and his eldest son Arthur; and on the death of the latter, in order to retain the dowry of this princess, he caused his remaining son Henry to marry the widow by papal dispensation, an event which, in the sequel, led to a separation from the see of Rome. He married his eldest daughter to James IV., king of Scotland, from which marriage there ultimately resulted the union of the two crowns. In his latter years his avarice became increasingly marked, two exchequer judges, Empson and Dudley, being employed in all sorts of extortion and chicanery in order to gratify this passion. His reign, however, was in the main beneficent. Its freedom from wars permitted the development of the internal resources of the country. His policy of depressing the feudal nobility, which proportionably exalted the middle ranks, was highly salutary. For a time, however, the power lost by the aristocracy gave an undue preponderance to that of the crown. Henry died at Richmond in 1509.

Henry VIII., King of England, son of the preceding, born in 1491, succeeded his father in 1509. He was soon prevailed upon to join in a league formed against Louis XII. of France. Some campaigns in France followed, but the success of the English at the Battle of the Spurs (1513) was succeeded by no adequate result, the taking of Tournay being the only fruit of this expensive expedition. Meantime, more splendid success attended the English arms at home, James IV. of Scotland being completely defeated and slain at Flodden Field (1513). Henry, however, granted peace to the Queen of Scotland, his sister, and established an influence which rendered his kingdom long secure on that side. Finding himself deluded by his allies, he soon after made peace with France, retaining Tournay and receiving a large sum of money. From 1515 until 1529 the government was practically in the hands of Wolsey, no parliament being summoned in that period until 1523. After the election of Charles V. to the German Empire, both Charles and the French king, Francis I., sought the alliance of England. A friendly meeting took place between Henry and Francis at the Field of the Cloth of Gold (1520), but the interest of Charles preponderated, and Henry declared war against France, though with no important results. Now came the determination of the king to divorce his wife Catharine, who was older than he, had borne him no male heir, and had, moreover, been in the first place the wife of his elder brother. The last of these points was the alleged ground for seeking divorce, though Henry was probably influenced largely by his attachment to Anne Boleyn, one of the queen's maids of honour. Wolsey, for his own ends, had at first been active in promoting the divorce, but drew back and procrastinated when it became apparent that Anne Boleyn would be Catharine's successor. This delay cost Wolsey his power and the papacy its authority in England. Henry in disgust eagerly caught at the advice of Thomas Cranmer, afterwards Archbishop of Canterbury, to refer the case to the universities, from which he soon got the decision that he desired. In 1533 his marriage with Catharine was declared null and an anticipatory private marriage with Anne Boleyn declared lawful; and as these decisions were not recognized by the pope, two acts of parliament were obtained, one in 1534 setting aside the authority of the chief pontiff in England, the other in 1535 declaring Henry the supreme head of the church. But although Henry discarded the authority of the Roman Church, he adhered to its theological tenets; and while, on the one hand, he executed Bishop Fisher and Sir Thomas More for refusing the oath of supremacy, he brought many of the reformers to the stake. Finding that the monks and friars in England were the most direct advocates of the papal authority, and a constant source of disaffection, he suppressed the monasteries by act of parliament, and thereby inflicted an incurable wound upon the Catholic religion in England. The fall of Anne Boleyn was, however, unfavourable for a time to the reformers. Henry then married Jane Seymour, and the birth of Prince Edward in 1537 fulfilled his wish for a male heir. The death of the queen was followed in 1540 by Henry's marriage with Anne of Cleves, the negotiations of which were conducted by Cromwell. The king's dislike to his wife, which resulted in another divorce, became extended to the minister who had proposed the union, and Cromwell's disgrace and

death soon followed. A marriage with Catharine Howard in 1541 proved no happier, and in 1542 she was executed on a charge of infidelity. In 1543 he married his sixth wife, Catharine Parr, a lady secretly inclined to the Reformation, who survived the king. In the meantime Scotland and France had renewed their alliance, and England became again involved in war. James V. ravaged the borders, but was defeated at Solway Moss in 1542, and in 1544 Boulogne was captured, Henry having again allied himself with Charles V. Charles, however, soon withdrew, and Henry maintained the war alone until 1546. Disease now so much aggravated the natural violence of Henry that his oldest friends fell victims to his tyranny. The Duke of Norfolk was committed to the Tower, and his son the Earl of Surrey was executed. Henry died on Jan. 28, 1547, and was succeeded by his son, Edward VI.

Henry, Matthew, an English Nonconformist divine, born in 1662. With the view of studying law he entered himself at Gray's Inn; but in 1687 settled as pastor to a dissenting congregation at Chester. He continued there twenty-five years, when he was removed to a larger charge at Hackney, London. He died of apoplexy at Nantwich in 1714, while on his return from a visit to his old congregation in Cheshire. Besides his greatest work, Exposition of the Old and New Testament (Romans to the end completed by others after his death), he was the author of A Discourse on Schism, A Scripture Catechism, Family Hymns, Sermons, and religious tracts.

Henry of Huntingdon, an English historian, born towards the end of the 11th century; Archdeacon of Huntingdon. He composed in Latin a general history of England from the earliest times down to his own day, the latter part being of considerable value. A letter of his, De Mundi Contemptu (On Contempt of the World), contains curious contemporary anecdotes of kings, nobles, and prelates. The time of his death is not known, but he must have been alive in 1154.

Henry the Lion, Duke of Saxony, the most remarkable prince of Germany in the 12th century, was born in 1129. He succeeded his father, Henry the Proud, in 1139, assuming the government of Saxony himself in 1146. At the diet of princes in Frankfort (1147) he demanded restitution of Bavaria, taken from his father by Conrad VII.; but was worsted in the war which followed. It was restored to him, however, in 1154, after the death of Conrad, by the Emperor Frederick, Henry's cousin. His possessions then extended from the Baltic and the North Sea to the Adriatic, and he was successful in opposing the league formed against him at Merseburg in 1166. About two years afterwards he separated from his wife and married Matilda, daughter of Henry II. of England. He then went on an expedition to the Holy Land, and during his absence his enemies, and even the emperor, made encroachments on his dominions. In 1174 he followed Frederick I. on his fifth expedition to Italy, but left him at the siege of Alessandria. He was then put under the ban of the empire, and his dominions were given to other princes. Henry defended himself for a time successfully, but was at last obliged to take refuge in England. In 1182 he asked pardon of the emperor on his knees, and Frederick promised him his hereditary possessions, Brunswick and Lüneburg, on condition of his undergoing exile for three years. He, therefore, again went to England, but returned to Brunswick in 1184. In 1188 he was once more compelled to leave the country, and it was only in 1190, at the close of a year's fighting, that a reconciliation was finally effected. Henry died at Brunswick 1195. He was much in advance of his age in fostering industry, science, commerce, and the arts.

Henry the Navigator (*Don Henrique el Navegador*), fourth son of King John I. of Portugal, born in 1394. In his youth he gave brilliant proofs of courage. When the Portuguese conquered Ceuta in 1415 Henry distinguished himself by his bravery, and was knighted by his father, after whose death he chose for his residence the city of Sagres, in Algarve, near Cape St. Vincent, and vigorously prosecuted the war against the Moors in Africa. He erected at Sagres an observatory and a school of navigation. From time to time he sent vessels on voyages to the coasts of Barbary and Guinea; resulting in the discovery of the islands of Puerto Santo and Madeira, and some years later of the Azores. In 1433 Gilianez, one of his navigators, safely doubled Cape Bojador, and other adventurers, pushing still further south, discovered Cape Blanco in 1441 and Cape Verd in 1445. A profitable commerce with the natives of West Africa was soon developed, and the Senegal and Gambia partially explored. After acting as general against the Moors in 1458 Henry

died at Sagres on the 13th of November, 1458. His efforts not only laid the foundations of the commerce and colonial possessions of Portugal, but gave a new direction to navigation and commercial enterprise.

Henryson, Robert, a Scottish poet of the 15th century, born about 1425, died about 1506. He spent most of his life at Dunfermline, where he was schoolmaster. The Testament of Cresseid, his most important work, is a continuation of Chaucer's Troilus and Creseide, though with individual merit, and he was probably the author of the early Scottish pastoral, Robin and Makyne. Amongst his other works were a Tale of Orpheus, The Moral Fables of Æsop in Scottish metre, and an allegorical ballad, The Bludy Serk.

Hepar Sulphuris (lit. 'liver of sulphur,' so called from its brownish-green and liver-like appearance), a mixture of polysulphides of potassium with sulphate or thiosulphate of potash. It is a common homœopathic medicine.

Hepat'icæ. See *Liverworts.*

Hepati'tis, a disease consisting in inflammation of some part of the liver.

Hephæs'tion, a noble Macedonian of Pella, the friend of Alexander the Great. He accompanied the king in his Asiatic campaigns, and died at Ecbatana (B.C. 325 or 324). Alexander had his body conveyed to Babylon, and erected a monument to him costing 10,000 talents.

Hephæs'tus, a god of the ancient Greeks, identified by the Romans with their Vulcanus. He presided over fire, and was the patron of all artists who worked in iron and metals. He fixed his residence in Lemnos, where he built himself a palace, and raised forges to work metals. The Cyclopes of Sicily were his workmen and attendants; and with him they fabricated not only the thunderbolts of Zeus, but also arms for the gods and the most celebrated heroes. His forges were supposed to be under Mount Ætna. Aphroditē (Venus) was the wife of Hephæstus.

Heppenheim, an interesting old walled town of Germany in Hesse-Darmstadt, 16 miles south of Darmstadt. Pop. 5250.

Hep'tarchy, the seven principal kingdoms into which England was divided in Anglo-Saxon times. The kingdoms were founded at different times, and at no one time were they all independent monarchies together. In 827 King Egbert of Wessex united the other kingdoms into one, and assumed the title of king of England. See *England.*

Hep'tateuch, a name sometimes given to the five books of Moses or Pentateuch, together with the books of Joshua and Judges.

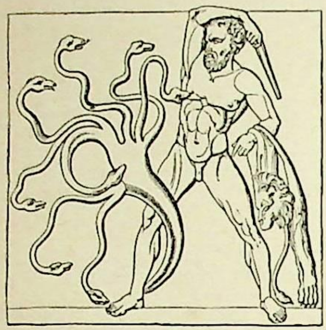
Hera, an ancient Greek goddess, identified by the Romans with their Juno, the sister and wife of Zeus (Jupiter), and daughter of Kronos (Saturn) and Rhea. The poets represent Zeus as an unfaithful husband, and Hera as an obstinate and jealous wife, the result of which is frequent strife between them. She was worshipped in all Greece, but her principal seats were at Argos and at Samos. The companions of Hera were the Nymphs, Graces, and Hours. Iris was her particular servant. Among animals, the peacock, the goose, and the cuckoo were sacred to her. Her usual attribute is a royal diadem on her head. The festivals in her honour were called Heræa. The principal were those celebrated every fifth year at Argos, which city was considered to be especially under her protection.



Hera.—Antique statue.

Her'acles, called by the Romans *Hercules*, the most celebrated hero or semi-divine personage of Greek mythology, was the son of Zeus (Jupiter) by Alcmena, the wife of Amphitryon. He was brought up at Thebes, and before he had completed his eighth month strangled two snakes sent by the jealous Hera (Juno) to devour him. In youth he had several distinguished instructors, among them the Centaur Cheiron. Early in life he had, at the command of Zeus, to subject himself for twelve years to the will of Eurystheus, on the understanding that after he had acquitted himself of this duty he should be reckoned in the number of the gods. He, therefore, went to Mycenæ, and performed at the bidding of Eurystheus the tasks known as the *twelve labours of Heracles.* These were: (1) to kill a lion which ravaged the country near Mycenæ; (2) to destroy the Lernæan hydra;

(3) to capture, alive and unhurt, a stag famous for its incredible swiftness, its golden horns, and brazen feet; (4) to capture alive a wild boar which ravaged the neighbourhood of Erymanthus; (5) to clean the stables of Augeas, where 3000 oxen had been confined for many years; (6) to kill the birds which ravaged the country near the lake



Hercules slaying the Hydra.—From sculpture at Florence.

Stymphalus, in Arcadia, and ate human flesh; (7) to bring alive into Peloponnesus a prodigious wild bull, which laid waste the Island of Crete; (8) to obtain the mares of Diomedes, which fed upon human flesh; (9) to obtain from the queen of the Amazons a girdle which she had received from Ares (Mars); (10) to kill the monster Geryon, king of Gades, and bring to Argos his numerous flocks, which fed upon human flesh; (11) to obtain apples from the garden of the Hesperides; (12) the last and most dangerous of all, to bring from the infernal regions the three-headed dog Cerberus. Besides these labours, he also achieved of his own accord others equally celebrated. Thus, he assisted the gods in their wars against the giants, and it was through him alone that Zeus obtained the victory. Having attempted to plunder the temple at Delphi, he became engaged in conflict with Apollo, and was punished by being sold to Omphălē, queen of Lydia, as a slave, who restored him to liberty and married him. Having latterly returned to Greece, he became the husband of Dejanira, who unwittingly brought about his death by giving him a tunic poisoned with the blood of the Centaur Nessus, which she innocently believed would retain for her Heracles's love. The poison took effect whenever the garment was put on, and as the distemper was incurable, Heracles placed himself on a burning pile on the top of Mount Œta, was received up into heaven, and being there reconciled to Hera, received her daughter Hebe in marriage. In ancient works of art Heracles is generally represented naked, with strong and well-proportioned limbs; he is sometimes covered with the skin of the Nemæan lion, and holds a knotted club in his hand, on which he often leans. The principal ancient statue of him which remains is the Farnese Hercules at Rome, a work of the Athenian Glycon. The myth of Heracles is believed by many writers to represent the course of the sun through the twelve signs of the zodiac. His marriage with Hebe was explained even by the ancients as symbolic of the renewing of the sun's course after its completion.

Heracle'um, a genus of large umbelliferous herbs, the cow-parsnips, of which *H. Sphondylium* (common cow-parsnip or hog-weed) is very common in Britain in damp meadow ground and pastures. *H. giganteum* (the Siberian cow-parsnip) is often grown in shrubberies, reaching the height of 10 feet.

Heracli'dæ, the descendants of Heracles, but more particularly those who, assisted by the Dorians, successfully asserted by arms their claim to the Peloponnesus, whence their ancestors had been driven by usurpers. See *Greece* (*History*).

Heracli'tus, a Greek philosopher, born at Ephesus, who flourished about 513 B.C. He travelled in different countries, particularly in Africa. On his return to Ephesus he was offered the chief magistracy, but refused it. He is said to have latterly repaired to solitary mountains to live on roots and herbs; but, being attacked by a fatal disease, was obliged to return to the city, where he died soon afterwards, it is said in his sixtieth year. He left a work on Nature, in which he treats also of religion and politics. Some fragments only of this work remain. He is considered as belonging generally to the Ionic school of philosophers, though he differed from it in important particulars. He considered fire as the first principle of all things, describing it as an ethereal substance, 'self-kindled and self-extinguished,' from which the world is evolved (not made) by a natural operation. It is also a rational principle, and the source of the human soul. Phenomena exist in a constant state of flux, always tending to assume new forms, and finally returning again to their source.

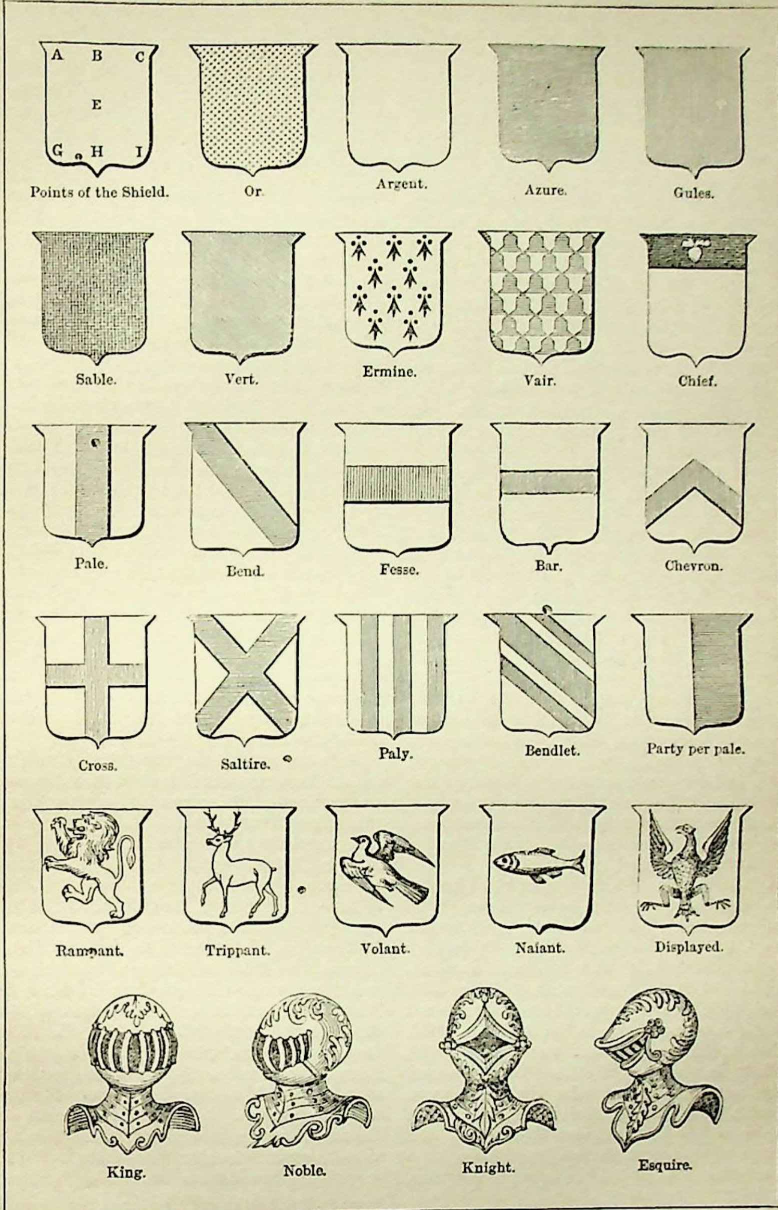
Heracli'us, Roman emperor of the East, born in Cappadocia about 575 A.D.; the son of Heraclius, exarch of Africa. At the head of a fleet from Carthage, in 610, he assisted in dethroning Phocas, the murderer and successor of the Emperor Mauritius, and himself ascended the throne. In a succession of splendid victories he crushed the Persians under Chosroes; but the energy of his earlier years seems to have worn itself out, and he made no effort to check the victorious progress of Mohammed. Before his death Syria, Palestine, Mesopotamia, and Egypt had fallen under the dominion of the caliphs. He died in 641, and was succeeded by his son, Constantine III.

Her'ald, an officer whose functions originally were to carry messages of courtesy or defiance between sovereigns or persons of knightly rank, to superintend and register the results of trial by battle, tournaments, and other chivalric exercises, to record the valiant deeds of combatants, proclaim war or peace, marshal processions and public ceremonials, and especially, in later times, to regulate and determine all matters connected with the use of armorial bearings. Heralds began to appear about the 12th century, and assumed the functions which ultimately belonged to their office gradually. The herald, after the office was fully constituted, was created with many ceremonies, and had to pass through various grades of protracted service before reaching the full dignity of a herald. The office is now shorn of much of its importance. Heralds are appointed in England by the earl marshal, whose office is hereditary. The Heralds' College, or College of Arms, founded by charter of Richard III. in 1483, consists of the three chief heralds (see *Garter King-of-Arms*), the six subordinate or provincial heralds of York, Lancaster, Chester, Windsor, Richmond, and Somerset; two heralds appointed on the accession of George I., called Hanover herald and Gloucester king-of-arms, together with the earl marshal and secretary, in all thirteen persons. There are four marshals or pursuivants, called blue-mantle, rouge-croix, rouge-dragon, and portcullis, who usually succeed to vacancies in the Heralds' College. Among the duties of the Heralds' College are the recording of pedigrees and the granting of coats of arms to persons who wish to assume them. The Heralds' College, or Lyon Court, in Scotland, consists of Lyon king-of-arms, and six heralds, with six pursuivants.

Herald-crab, a species of crab (*Huenia heraldica*) the carapace of which presents a fanciful resemblance to the shield and mantle figured by heraldic painters in depicting coat-armour.

Her'aldry, the whole science of a herald's duties, or more commonly the knowledge of the forms, terms, and laws which pertain to the use of armorial bearings or coats of arms. Badges and emblems on shields, helms, banners, &c., naturally occurred in the earliest times, and the symbols were sometimes hereditary. The origin of heraldic arms, properly so called, is, however, to be attributed to the necessity which arose during the Crusades of distinguishing the leaders of the numerous and motley bands of warriors which constituted the Christian armies. One of the oldest specimens of heraldic bearings extant is the shield at Mans of Geoffrey Plantagenet, who died in 1150. Rolls of arms in England are extant from the reigns of Henry III., Edward I., and Edward II. The use of arms on the Great Seal of England was introduced by Richard I. The bearing of coat-armour by private persons was prohibited by proclamation in the reign of Henry V. The chief courts of jurisdiction in questions of heraldry are the Heralds' College in England, and the Lyon Court in Scotland. (See *Herald.*) The rules of heraldry now practised at the Heralds' College are comparatively modern, and differ in some respects from those of other European courts. A coat of arms consists of the figure of a shield marked and coloured in a vast variety of ways, so as to be distinctive of an individual, a family, or a community. The shield or *escutcheon* represents the original shield used in war, and on which arms were anciently borne. The surface of the escutcheon is termed the *field*, and the several parts or *points* of it have particular names, so that the figures which the field contains may be precisely located. In the accompanying illustration A B C marks the part of the shield called *the chief*, which is the highest and most honourable part of the shield. A is the *dexter chief* or upper *right-hand* side of the shield; B, the *middle chief;* and C, the *sinister chief*, or upper *left-hand* side of the shield; E, the *centre* or *fesse point;* G H I, the *base*, that is, G, the *dexter* or right-hand *base;* H, the *middle base;* and I, the *sinister* or left-hand *base.* Colour is given in the coat of arms by means of *tinctures*, two of which are *metals—or* and *argent*, that is, gold

and silver—the rest *colours* proper. These colours are, in heraldic terminology: *azure*, blue; *gules*, red; *sable*, black; *vert*, green; *purpure*, purple; *tenney*, orange; *sanguine*, blood-colour. The two last are comparatively uncommon. An object represented in its natural colours is said to be *proper*. When not given in colours or by actual gilding the tinctures are represented by points and lines in black and white. *Or* is distinguished by small dots covering the part; *argent* is represented by leaving the space blank; *azure* is shown by horizontal lines; *gules*, by perpendicular lines; *sable*, by perpendicular and horizontal lines crossing each other; *vert*, by diagonal lines running from the dexter chief to the sinister base; *purpure*, by diagonal lines running from the *sinister* chief to the *dexter* base. Another class of tinctures are the *furs*, of which the two principal are *ermine* and *vair*, and which have also their special method of representation. The figures borne on the shield may be either purely artificial and conventional, or may represent real objects, animals, plants, &c. Of the former the most common are known as *ordinaries*, and have the following names: Chief, Pale, Bend, Fesse, Bar, Chevron, Cross, and Saltire. The *chief* is a portion of the shield at the top marked off by a horizontal line, and covers the upper third part of the field. The *pale* occupies the middle third part of the field perpendicularly. The *bend* is drawn diagonally from the dexter chief to the sinister base in the form of a belt, and also occupies the third of the field. A diminutive of the bend is the *bendlet*. The *fesse* occupies the middle third of the field horizontally. The *bar* is formed after the manner of a fesse, but occupies only a fifth of the field, and is not confined to any particular part of it, except when there is only one bar, when it is put in the place of a fesse. Bars are mostly two in a field, sometimes three or more. A diminutive is the *barrulet*. The *chevron* may be regarded as made of a bend dexter and sinister issuing from the right and left base points of the escutcheon and meeting like two rafters. The *cross* is the ordinary cross of St. George. The *saltire* is the equally well-known cross of St. Andrew. The shield is often divided by lines running similarly to the ordinaries; hence when divided by a perpendicular line it is said to be *party per pale*, when by a horizontal line *party per fesse*, when by a diagonal line *party per bend*. Similarly, when it seems to bear several pales or bends or bars, it is said to be *paly*, *bendy*, or *barry* of so many pieces, 'paly of six argent and gules' for instance, as in illustration. *Charges* are the figures of natural and artificial things, and include animals and plants, implements and objects of all sorts, and various imaginary monsters, being drawn either on the field or on one of the ordinaries. It is a rule in heraldry that metal must not be put on metal nor colour on colour; hence, if the field say is *argent*, it cannot have a charge or an ordinary tinctured *or* directly upon it. Various technical terms describe the position of animals; thus, a lion is *rampant* when he is erect standing on one of his hind legs; *sejant*, when sitting; *couchant*, when lying at rest, with the head erect; *passant*, in a walking position; *gardant*, looking full-faced; *rampant gardant*, erect and looking full-faced; *salient*, in a leaping posture. So *trippant* is said of the stag when trotting; *lodged*, of the stag when at rest on the ground; *volant*, of birds in general in a flying posture; *rising*, of a bird that is preparing to fly; *displayed*, of birds seen frontwise with outspread wings; *naiant*, of fishes when swimming; and so on. The teeth and claws of lions and other ravenous beasts are called their *arms;* and when these have a special tincture the animal is said to be *armed* of such a tincture; similarly if their tongue be of a special tincture, they are said to be *langued* of this tincture. Often two or more coats of arms are united together on one shield, so that the whole may be a very complicated affair. The art of arranging arms in this way is known as *marshalling*, and when the shield is divided up into squares for the reception of different coats, it is said to be *quartered*. There are also certain exterior ornaments of the shield or escutcheon, namely, the helmet, mantling, crest, wreath, motto, and supporters. The helmet, which is placed on the top of the escutcheon, varies both in form and materials. Those of sovereign princes are of gold, those of the nobility of silver, and those of gentlemen of polished steel. The *full-faced helmet*, with six bars, is for the king and princes of the blood; the *sidelong helmet*, with five bars, is for dukes and marquises, &c.; the *full-faced helmet of steel*, with its beaver or vizor open, is for knights; and the *sidelong helmet*, with the vizor shut, for the esquire. The mantling or mantle was anciently fixed to the helmet, to which it served as a covering. Mantlings are now


A B C
E
G H I
Points of the Shield.
Or.
Argent.
Azure.
Gules.
Sable.
Vert.
Ermine.
Vair.
Chief.
Pale.
Bend.
Fesse.
Bar.
Chevron.
Cross.
Saltire.
Paly.
Bendlet.
Party per pale.
Rampant.
Trippant.
Volant.
Naiant.
Displayed.
King.
Noble.
Knight.
Esquire.

used like cloaks, to cover the whole achievement. The crest is placed above the helmet, with the wreath serving as a kind of support; the latter is composed of two colours wreathed or twisted together. The motto consists of the word or phrase carried in a scroll under or above the arms. Supporters were originally only ancient devices or badges, which by custom came to embellish armorial ensigns. They are called *supporters* because they hold the shield, as the lion and the unicorn in the well-known royal arms of England. The present royal arms of Britain exhibit the arms of England, Scotland, and Ireland in the four quarters of the shield; that is: Quarterly, 1 and 4, England; 2, Scotland; 3, Ireland. The arms of England are: Gules, three lions passant gardant in pale or; Scotland, Or, a lion rampant within a double tressure flory counter-flory gules; Ireland, Azure, a harp or, stringed argent.

Heralds' College. See *Herald*.

Herat', a city in the north-west of Afghanistan, in a beautiful and fertile plain, about 370 miles west of Cabul. It is inclosed by a broad deep moat, and an earthen mound surmounted by a lofty wall of unburned brick, and defended by a strong citadel. From each of four of the five gates a long street of bazaars (one vaulted throughout its entire length) leads towards a square in the centre of the town. The remaining streets are narrow and dirty. The most important manufactures are carpets, sword-blades, shoes, cloaks, and sheepskin caps. The trade, almost entirely in the hands of Hindus, is greatly favoured by the situation of the town on the great thoroughfare from India westward. Herat was long the capital of the empire founded by Tamerlane. Pop. about 45,000.

Hérault (ā-rō), a department of France, on the Mediterranean coast; area, 2393 square miles. In the north-west it is covered by the Cevennes, but it descends rapidly towards the coast, which is lined by lagoons. The chief rivers, the Hérault, Orb, and Lez, are partly navigable; but the most important water communication is the Canal du Midi. The arable land, about one-sixth of the whole, is generally fertile. The vine and mulberry are extensively, the olive more partially cultivated; fruit is abundant; and aromatic, medicinal, and dye plants are largely grown. Salt is obtained in large quantities. Capital Montpellier. Pop. 441,527.

Herba'ceous Plants, perennial plants of which the stem perishes annually, while the roots remain permanent and send forth a new stem in the following season.

Herba'rium, or HORTUS SICCUS, a collection of dried plants systematically arranged. The specimens should be collected in dry weather, and carried home in a japanned tin-box or vasculum, a small pocket-box being desirable, however, for mosses and small plants. Very delicate specimens should be at once placed in a small field-book of unsized blotting-paper carried tightly strapped between suitable boards. At home they are carefully arranged upon bibulous paper, and pressed between smoothly planed deal boards either by putting weights upon the boards or by using a screw-press. The paper is changed every day or two, as they are found to part with their moisture more or less freely. Succulent plants (such as stonecrops) should be killed by immersion in boiling water, and left for some time to drain, before pressing. If the stem be thick and woody, or if the flower be thick and globular, as in the thistle, one half may be cut away without depriving it of its character. When the process of desiccation has been completed specimens are fastened upon stiff paper (17 inches by 10½) with a mixture of gum-tragacanth and gum-arabic, or thin glue, or with slips of gummed paper, or a needle and thread. To preserve the specimens from the ravages of insects, camphor should be placed in the cabinet and frequently renewed.

Herb-bennet (that is, Saint Bennet or Benedict's herb), a plant, *Geum urbānum*, known also as *Avens*. It is aromatic, tonic, and astringent, and has been used in medicine, and as an ingredient in some ales.

Herb-Christopher, the bane-berry, *Actæa spicata*.

Herbert, EDWARD, Lord Herbert of Cherbury, in Shropshire, an English writer, born 1581, and educated at University College, Oxford. In 1609 he distinguished himself at the siege of Juliers under the Prince of Orange, and in 1614 served again in the Low Countries under the same leader. In 1618 he was sent ambassador to the court of France, but was recalled in consequence of a quarrel with Constable Luynes, the favourite of Louis XIII. On the death of Luynes, however, he was sent back to France as resident ambassador. At Paris, in 1624, he printed his famous book, De Veritate, with the object of asserting the sufficiency,

universality, and perfection of natural religion. In 1625 he returned from France and was created an Irish peer, and in 1631 an English baron. He joined the parliamentary party, but subsequently quitted it, and suffered in fortune in consequence. He died in London 1648. The character of Lord Herbert, as shown in his memoirs, was vain, punctilious, and quixotic, but open, generous, and brave. Another work of his was De Religione Gentilium. Soon after his death was published his Life and Reign of Henry VIII., and a collection of his poems was published in 1665.

Herbert, GEORGE, poet and divine, brother of Lord Herbert of Cherbury, born 1593; was educated at Westminster and at Trinity College, Cambridge, of which he became a fellow in 1615. From 1619 till 1627 he was university orator. The death of James I. in 1625 put an end to his prospects of civil promotion, and in the same year he took orders, and became a prebendary in the diocese of Lincoln. In 1630 he took priest's orders, and was presented to the rectory of Bemerton, near Salisbury, in Wiltshire. He died in 1633. His collection of religious poems, The Temple, was published in 1631, and the Jacula Prudentum, a collection of proverbs, in 1640. His poems bear the marks of an exceptionally fine nature, if not of genius, but they are marred by conceits and mannerisms. His chief prose work was The Country Parson (1652).

Herbert, SIDNEY, LORD HERBERT OF LEA, English statesman, son of the eleventh Earl of Pembroke, was born in 1810. He was educated at Harrow and Oxford, and was Conservative member for South Wilts from 1832 till shortly before his death. He was secretary to the admiralty under Peel in 1841, and in 1845 was made secretary for war, but became a convert to free-trade, and quitted office with Peel in 1846. In 1852 he became war secretary in the Aberdeen cabinet, and retained it till the dissolution of the ministry in 1855. For a short time he was colonial secretary under Palmerston, and in 1859 became once more secretary for war. Early in 1861 he was transferred to the House of Lords, but died in the same year.

Herb-gerard. See *Bishop-weed.*

Herb-robert, the *Geranium Robertianum*, called also *Stinking Crane's-bill*, a common British plant. It is astringent and aromatic, and has been used in nephritic disorders.

Hercinite, a variety of the mineral called spinel.

Hercula'neum, an ancient city about 5 miles S.E. from Naples, completely buried with Pompeii, Stabiæ, &c., by lava and ashes during an eruption of Vesuvius in the reign of Titus, A.D. 79. The site had been long sought in vain, when in 1713 three statues were found in digging a well at the village of Portici. In 1738 the well was dug deeper, and traces of buildings were found. The theatre was then discovered, but though the excavations were continued for many years it is now the only building to be seen underground, as the successive excavations were immediately filled up with rubbish from a new digging. A number of public buildings and private dwellings were laid bare, and many objects of great value discovered, such as statues, busts, beautiful mosaics, wall paintings, charred papyrus manuscripts, &c. One of the houses discovered contained a quantity of provisions, consisting of fruits, corn, oil, pease, lentils, pies, and hams. Few skeletons have been found either in Pompeii or Herculaneum, so that it is probable most of the inhabitants had time to save themselves by flight. Among the most interesting objects discovered here were the papyri, over 1750 of which are now in the Naples Museum, but hardly a third have yet been unrolled, the process presenting great difficulties from the tendency of the MSS. to crumble. The knowledge of ancient art has, however, gained more by the discoveries made here than literature.

Hercules. See *Heracles.*

Hercules, one of Ptolemy's northern constellations, including 113 stars. The point to which the sun, with its accompanying system of planets, is travelling at present is situated in this constellation, which includes some remarkable star groups and nebulæ.

Hercules, PILLARS OF, the ancient name of the two promontories, Calpe (Gibraltar) and Abyla (Ceuta), at the entrance to the Mediterranean.

Hercules-beetle, a very large Brazilian lamellicorn beetle, *Scarabæus* or *Hynastes Hercules*. An enormous horn projects from the head, and a smaller one from the thorax, and the beetle attains a length of 5 inches.

Hercynian Forest, the general name given by the ancients to the forest-clad mountains in Central Germany, extending from the Rhine to the Carpathians.

Herder, JOHANN GOTTFRIED VON, German author, born in poor circumstances in 1744.

He went in 1762 to Königsberg, procured an appointment in Frederick's College, and was permitted by Kant to hear all his lectures gratis. From 1764 to 1769 he was an assistant teacher at the cathedral school of Riga, with which office that of a preacher was connected, and it was during this period that he published his Fragments on German Literature. In 1769 he resigned his post in order to travel, and became travelling tutor to the Prince of Holstein-Oldenburg. But in Strasburg he was prevented from proceeding by a disease of the eyes; and here he became acquainted with Goethe, on whom he had a very decided influence. Besides his Fragments, his Critical Woods (Kritische Wälder) and other productions had gained him a considerable reputation, and he was appointed in 1771 court preacher, superintendent, and consistorial counsellor at Bückeburg, and in 1776 to the same offices at Weimar. In 1801 he was made president of the high consistory, a place before only given to noblemen. He was subsequently made a noble by the Elector of Bavaria. He died in 1803. As a theologian Herder contributed to a better understanding of the historical and antiquarian part of the Old Testament. His Geist der Hebräischen Poesie (Spirit of Hebrew Poetry) is highly valued. He did much also for the better appreciation of the classical authors. His greatest work is his Ideen zur Philosophie der Geschichte der Menschheit (Ideas on the Philosophy of the History of Man; 1785 et seq.). He is the author of some pleasing songs, and of an epic entitled The Cid.

Heredit'aments, in law, any species of property that may descend to an heir. *Corporeal* hereditaments consist of material and tangible possessions, *incorporeal* hereditaments of rights and privileges not themselves tangible, though conferring claims on tangible possessions.

Hereditary Diseases. See *Disease.*

Hered'ity, the transmission from parent to offspring of physical and intellectual characters. This has been at all times believed in, but it is only in recent times that the conviction has, in the hands of Darwin, Herbert Spencer, and Wallace, been methodized so as to embody an important zoological doctrine. The modern view of evolution in biology rests upon the belief that acquired peculiarities, or differences which may arise between parent and offspring, can be transmitted with some probability of permanence, especially if the variation presented by the young is determined by external conditions, or if it is such as to adapt the possessor more thoroughly to the conditions under which it is placed. On the other hand, while variations may be thus permanently transmitted by heredity, yet this very tendency of the young to repeat the characters of the parent is also a check on variability, or the tendency of structure and attributes to change with the environment. It may be noted that while the strong tendency to hereditary transmission works in the majority of cases so as to perpetuate those most fitted to survive, it secures the same result in other cases by a converse action. The descent of disease in families tends ultimately to purify the race by accumulating incapacities which end in the extinction of the enfeebled strain.

Hereford (he're-ford), a city and parliamentary borough of England, capital of county of same name, on the left bank of the Wye. The principal streets are broad and straight; houses mostly of brick, and the public buildings of stone. The beautiful cathedral near the Wye was rebuilt, in the reign of William the Conqueror, on the site of an earlier edifice, and restored in 1863 under the direction of Sir G. G. Scott. Other public buildings are the college adjoining the cathedral, the shire-hall, the county-jail, free library and museum, corn exchange, market-hall, and post-office. The manufactures, which are inconsiderable, consist of gloves, leather, turnery, nails, &c. Hereford was long an important garrison town on the Welsh border, and was the last city to surrender to the Parliamentarians. The borough returns one member. Pop. 20,267.—The county, which is entirely inland, and borders on Wales, has an area of 532,898 acres, of which about 500,000 are arable, meadow, and pasture. The county belongs wholly to the basin of Severn, towards which river it has a general slope north to south, as indicated by the course of its rivers, the Wye and its affluents. The soil is in general fertile. Wheat is the principal crop, but barley, oats, beans, pease, hops, and turnips are also extensively cultivated. Orchards are numerous, and a large quantity of excellent cider is made. The Herefordshire cattle are held in high estimation for meat, though not good milkers. Horses are bred in considerable numbers. Oak timber is abundant, and forms, with oak-bark, an article of export. For parliamen-

tary purposes Herefordshire forms two divisions (a northern and a southern), each returning one member. The only parl. bor. is Hereford. Pop. (1891), 115,986.

Heretic, one who embraces a heresy, that is, one who holds some theological doctrine which conflicts with the beliefs of the Catholic or universal church, but who, at the same time, calls himself a Christian. Many of the early Christians preserved their Jewish or Greek philosophical notions, and mingled them with the doctrines of Christianity. Even in the time of the apostles we find traces of the Gnostics, and subsequently a great variety of heretical sects or sectaries arose. Among the chief may be mentioned the Manichæans, Sabellians, Arians, Apollinarians, Nestorians, Monophysites, Pelagians, Monothelites, Paulicians, &c. Among religionists stigmatized as heretics in later times by the Roman Catholic Church, were the Waldenses, the Wicliffites, Hussites, Lutherans, and all Protestant sects and churches. Before Christianity was made the religion of the Roman state, nothing but excommunication was inflicted upon the heretic; but severe laws were passed soon after the conversion of the emperors. The code of Justinian contains many ordinances against heretics, and the canon law made it a duty to denounce them, under pain of excommunication. As early as 385 Priscillian was condemned to death as a heretic by the Spanish bishops at the Council of Trèves; but the persecutions of heretics, properly so called, began in the pontificate of Gregory VII., in the 11th century. Spain, Italy, and France, from the 13th to the 16th century, suffered much from these persecutions, but the states of Germany showed greater moderation. In England the burning of heretics was practised before 1200, and long continued. Heresy is now left entirely to the cognizance of the ecclesiastical courts.

Herford, a town of Prussia, in Westphalia, 16 miles south-west of Minden. It has manufactures of linen and cotton goods, leather, basket-work, and tobacco; oil-mills, &c. Pop. 19,255.

Heriot, in English law, a tribute or fine, as the best beast or other chattel, payable to the lord of the fee on the decease of the owner, landholder, or vassal.

Her'iot, George, founder of the hospital in Edinburgh which bears his name, and jeweller to King James VI., was born in 1563. He followed his father's profession, and was admitted a member of the Incorporation of Goldsmiths in 1588. In 1597 he was appointed goldsmith to the queen by James VI., and on the accession of the latter to the English crown followed the court to England. From his settlement in London little is known of his history. He died in 1624. He left nearly the whole of his fortune to found an hospital in Edinburgh for the maintenance and education of poor fatherless boys, freemen's sons, of the town. The present magnificent structure known as Heriot's Hospital was built between 1628 and 1659. See *Edinburgh*.

Herisau, a town of Switzerland, in the canton and 4 miles north-west of Appenzell. It has manufactures of muslin and other kinds of cotton goods. Pop. 11,703.

Heristal. See *Herstal*.

Heritable Jurisdictions, grants of criminal jurisdiction formerly bestowed on great families by the Scottish crown, with a view to expedite the administration of justice. Possessors of these jurisdictions could within their domain fine, scourge, imprison, and even in some cases put to death without interference of the common law. They were abolished after the rebellion of 1745.

Heritable Securities, in Scotch law, the term applied to what is known in English law as mortgages and charges on land.

Heritors, in Scotch law, such proprietors of lands and houses in any parish as are liable to public burdens, especially the upkeep of the parish church.

Her'mann, Johann Gottfried Jakob, a German scholar, born in 1772. He began to lecture on ancient literature at Leipzig in 1794, and with this university he was connected till his death in 1848. Hermann originated valuable reforms in the method of Greek grammatical instruction; and he is especially known for his editions of Æschylus, Euripides, Aristophanes, Bion, and Moschus, and for the controversies in which his theories involved him with Voss, Creuzer, Böckh, Ottfried Müller, and other scholars.

Her'mannstadt, a town of Transylvania, on the Cibin, 54 m. s.s.e. Klausenburg. It consists of a high and a low town, connected by steep stone stairs, and of three suburbs. It was strongly fortified up to quite recent times. It is the seat of the governor of the province and of the Greek metropolitan of Transylvania. The manufactures are varied, and there is an important transit trade, chiefly to and from Constantinople. Pop. 19,446.

Hermaph'rodite, an animal in which the characteristics of both sexes are either really or apparently combined, especially an animal having the parts of generation both of male and female, so that reproduction can take place without the union of two individuals. Hermaphrodites are divided into true and spurious, the first exhibiting a real combination of the characteristics of the two sexes; while in the second the combination is only apparent. The animals in which the organs of the two sexes are normally combined in the same individual are confined to the invertebrate division of the animal kingdom, as for example certain groups of the inferior worms, molluscs, barnacles, &c. There are no real hermaphrodites in the human species.

Hermaphrodite Brig, a brig that is square-rigged forward and schooner-rigged aft.

Hermas, one of the so-called apostolic fathers, generally supposed to be the person mentioned by that name in Rom. xvi. 14, though others maintain that he lived much later. He is known as the author of a work entitled the Shepherd, circulated at Rome early in the second century, and for which a place in the canon was even claimed. Only a few fragments exist of the Greek original, but the Latin translation, made at a very early period, appears to be complete.

Hermeneu'tics (from a Greek word meaning to explain or interpret), the science which fixes the principles of the interpretation of the sacred writings. Hermeneutics bears the same relation to *exegesis* as *theory* to *practice*. See *Exegesis*.



Hermēs.—Wall painting, Pompeii.

Hermēs, called by the Romans *Mercurius* (see *Mercury*), in Greek mythology the son of Zeus and Maia, the daughter of Atlas. He was born in Arcadia, and soon after his birth left his cradle and invented the lyre by stringing the shell of a tortoise with three or seven strings. The lyre, however, he resigned to Apollo, with whom it was ever after identified. Hermēs also invented the Pandean pipe. The ancients represent Hermēs as the herald and messenger of the gods. He conducted the souls of the departed to the lower world. He was the ideal embodiment of grace, dignity, and persuasiveness, but also of prudence, cunning, fraud, perjury, theft, and robbery. His cunning was frequently of service both to the gods and the heroes, and even to Zeus himself. Later writers ascribe to him the invention of dice, music, geometry, letters, &c. He was worshipped in all the cities of Greece, but Arcadia was the chief place of his worship, his festivals being called *Hermæa*. In the monuments he is represented as in the flower of youth, or in the full power of early manhood. He often appears with small wings attached to his head and to his ankles. Among his symbols are the cock, the tortoise, a purse, &c., and especially his winged rod, the *caduceus*.

Hermes, GEORG, a German theologian, born 1775. He studied theology at the University of Münster; became teacher in the gymnasium of that city, and in 1807 professor of dogmatic theology in the university. When the Prussian government established the University of Bonn, Hermes was appointed to the chair of Catholic theology (1820). Here he distinguished himself by an ingenious effort to base the doctrines of the church on Kant's system of philosophy —an attempt known as Hermesianism. It aroused powerful opposition, being condemned as heretical by a papal letter of 1835, two years after the death of its originator.

Hermes Trismegis'tus, a mythical personage, the reputed author of a great variety of works, probably written by Egyptian Neo-Platonists, who ascribed the authorship of the highest attainments of the human mind to Thoth, the Egyptian Hermes; regarding him as the source of all knowledge and inventions, the *Logos* incarnate, thrice greatest (Gr. *tris megistos*). Clement of Alexandria mentions the contents of forty-two books of Hermes which were extant in his time. Of those which now remain the most important is the Poimandrēs or Poimander, a dialogue on nature, the creation, the deity, the soul, knowledge, and similar topics. Of the extant works none belongs, in all probability, to an earlier date than the 4th or perhaps the 3d century of our era.

Hermetic Art, another name for *Alchymy* (which see).

Hermetic Sealing, the term used to denote a very old process in which a glass vessel, such as a tube or flask, has its neck so fused together that no part of the contained matter can escape, and nothing foreign can get in.

Hermitage, one of the finest French wines, produced along the Rhône between Valence and Valière, in the *ci-devant* Dauphiny. It is of two kinds, red and white; the former is preferred.

Hermit-crab, a name common to a family (Paguridæ) of well-known decapod crustaceans. These crabs take possession of and occupy the cast-off univalve shells of various molluscs, carrying this habitation about with them, and changing it for a larger one as they increase in size. The most common British species is the *Pagurus Bernhardus*, popularly known as the soldier-crab.

Hermits. See *Anchorites.*

Hermon, a mountain of Syria, belonging to the Anti-Lebanon, about 9400 feet high.

Hermop'olis. See *Syra.*

Hermosillo (-sil'yō), a city in the state of Sonora, Mexico, on the river Sonora, 110 miles north from the port of Guaymas, with which it has a large traffic. It has a mint, distilleries, and flour-mills. Pop. 14,000.

Hernandia, a genus of large East Indian trees, forming the nat. order Hernandiaceæ. They have alternate entire leaves and flowers arranged in axillary or terminal spikes or corymbs. *H. Sonora*, or Jack-in-the-box, is so called from the noise made by the wind whistling through its persistent involucels. The fibrous roots chewed and applied to wounds caused by the Macassar poison form an effectual cure, and the juice of the leaves is a powerful depilatory. The wood is light, that of *H. guianensis* takes fire so readily from a flint and steel that it is used in the same way as amadou.



Hernandia Sonora (Jack-in-a-box).

Hernia, in surgery, a tumour formed by the displacement of a soft part, which protrudes by a natural or accidental opening from the cavity in which it is contained. The brain, the heart, the lungs, and most of the abdominal viscera may become totally or partially displaced, and thus give rise to the formation of hernial tumours. But the term is ordinarily applied to abdominal hernia. Every part of the abdomen may become the seat of hernia, but it most commonly appears in the anterior and inferior region, which, being destitute in a great measure of muscular fibres, and containing the natural openings, offers less resistance to the displacement of the viscera. Most of the viscera, when displaced, push the peritoneum forward before them: this membrane thus forms an envelope of the hernia, which is called the *hernial sac.* The hernia itself is usually a loop of the small bowel, and though it has been pushed through the wall of the abdomen, forming a tumour under the skin, the fæces still pass along it. If the hernia can be returned to the abdomen, it is said to be reducible; if, from its size or other cause, it cannot be replaced, it is irreducible. A hernia is said to be strangulated when it is not only irreducible, but also subjected to a continual constriction, which interferes with the circulation through the blood-vessels of the part and the passage of the fæces. It may be rapidly fatal. Constriction may be produced by different causes, but generally occurs at the margins of the opening through which the hernia protrudes. As soon as a patient perceives that he is affected with a hernia he should have recourse to medical advice, for the disease is then in its most favourable state for treatment. The hernia when it is reduced must be prevented from recurring by the constant pressure of a pad or truss. An irreducible hernia must be supported with great care. All violent exercises, and excess in diet, must be avoided. The strangulated hernia requires prompt relief, and may necessitate an operation.

Hernösand (her'neu-sàn), a seaport and cathedral town of Sweden, capital of Westernorrland, on the island Hernö, in the Gulf of Bothnia, with a considerable shipping trade. Pop. 5621.

Hero, a Greek priestess of Aphroditē at Sestos, on the coast of Thrace, for love of whom Leander, a youth of Abydos, swam every night across the Hellespont, guided by a torch from her tower. He was at length drowned in the attempt and his body washed ashore, when Hero, overcome with anguish, threw herself from the tower on the corpse of her lover, and perished. There is a Greek poem by Musæus on this subject.

Hero (OF ALEXANDRIA), one of the most distinguished Greek mathematicians and mechanists of ancient times, who flourished about B.C. 150–100. A common pneumatic toy, called Hero's fountain, is attributed to him, and he also invented the æolipile, a heliostat, &c.

Her'od, called THE GREAT, King of the Jews, was a native of Ascalon, in Judea, where he was born about 74 B.C. He was the second son of Antipater the Idumean, who, being made procurator of Judea by Julius Cæsar, appointed Herod to the government of Galilee. He at first embraced the party of Brutus and Cassius, but after their death reconciled himself to Antony, by whose interest he was first named Tetrarch, and afterwards king of Judea. After the battle of Actium he successfully paid court to Augustus, who confirmed him in his kingdom. On all occasions his abilities as a politician and commander were conspicuous; but his passions were fierce and ungovernable, and his wife Mariamne, her brother, grandfather, and mother, and his own sons by her, were all put to death by him. He rebuilt the temple at Jerusalem with great magnificence, and erected a stately theatre and amphitheatre in that city. He also rebuilt Samaria, which he called Sebaste, and constructed many strong fortresses throughout Judea, the principal termed Cæsarea, after the emperor. The birth of Jesus Christ is said to have taken place in the last year of the reign of Herod, viz. B.C. 4, the year also signalized by the massacre of the children of Bethlehem. Herod's policy and influence gave a great temporary splendour to the Jewish nation, but he was also the first to shake the foundation of the Jewish government, by dissolving the national council, and appointing the high-priests and removing them at pleasure, without regard to the laws of succession.

Herod Agrippa I., son of Aristobulus by Berenice, daughter of Herod the Great. From his attachment to Caligula he was imprisoned by Tiberius, but on the accession of Caligula (A.D. 37) he received the government of part of Palestine, and latterly all the dominions of Herod the Great. To please the Jews, with whom his rule was very popular, he caused St. James to be put to death, and imprisoned St. Peter. He died in the circumstances related in Acts xii., in A.D. 44.

Herod Agrippa II., son of the preceding, and last of the Herodian line. Being too young to govern, Judea was, on his father's death, reduced to a Roman province. He subsequently received the kingdom of Chalcis, and obtained the superintendency of the temple at Jerusalem, where, with his sister, Berenice, he heard the defence of Paul before Festus. Being driven from Jerusalem by the revolt of the Jews he joined Cestius, and later on Vespasian, and during the siege of Jerusalem was very serviceable to Titus. After its reduction (A.D. 70) he and Berenice (with whom he was suspected to have an incestuous intercourse) returned to Rome. He is supposed to have died there, A.D. 94.

Herod An'tipas, son of Herod the Great by his fifth wife, Cleopatra, was appointed tetrarch of Galilee on his death (B.C. 4). This was the Herod who put to death St. John the Baptist, in compliment to his wife Herodias in revenge for his reproaches of their incestuous union. Having visited Rome he was accused of having been concerned in the conspiracy of Sejanus, and was stripped of his dominions, and sent (A.D. 39) with his wife into exile at Lugdunum (Lyons), or, as some say, to Spain, where he died.

Herodio'nes, the herons, a modern name for an order of birds including the herons proper, but also the bitterns, storks, spoonbills, ibises, &c.

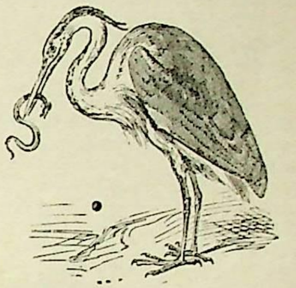
Herod'otus, the oldest Greek historian whose works have come down to us, the 'father of history,' born at Halicarnassus in Asia Minor about B.C. 484. Before writing his history he travelled extensively, visiting the shores of the Hellespont and the Euxine, Scythia, Syria, Palestine, Babylon and Ecbatana, Egypt as far as Elephantine and other parts of northern Africa, everywhere investigating the manners, customs, and religion of the people, the history of the country, productions of the soil, &c. On returning home he found that Lygdamis had usurped the supreme authority in Halicarnassus, and put to death the noblest citizens, among others his uncle, the epic poet Panyasis, and Herodotus was forced to seek an asylum in the island of Samos. Having formed a conspiracy with several exiles he returned to Halicarnassus and drove out the usurper, but the nobles who had acted with him immediately formed an aristocracy more oppressive than the government of the banished tyrant, and Herodotus withdrew to the recently founded colony of Thurii, in Italy, where he seems to have spent most of his remaining life. Here,

at an advanced age, we are told by Pliny, he wrote his immortal work, a statement strengthened by the fact that events are noticed in the body of the book which occurred so late as 409 B.C., while its abrupt ending proves almost beyond question that he was prevented by death from completing it. The history is divided into nine books, each bearing the name of a muse, and is written in the Ionic dialect. The object of the historian is to narrate the conflict between the Greeks and Persians, and he traces the enmity of the two races back to mythical times. Rapidly passing over the mythical period he comes to Crœsus, king of Lydia, of whom and of his kingdom he gives a comparatively full history. The conquest of Lydia by Cyrus induces him to relate the rise of the Persian monarchy and the subjugation of Asia Minor and Babylon. The history of Cambyses and his Egyptian expedition leads him to introduce the valuable details of the history, geography, and manners and customs of Egypt, which occupy the second book. The Scythian expedition of Darius causes the historian to treat of the Scythians and the north of Europe; and the subsequent extension of the Persian kingdom affords him the opportunity for giving an account of Cyrene and Libya. In the meantime the revolt of the Ionians breaks out, which eventually brings on the conflict between Greece and Persia. An account of this outbreak and of the rise of Athens after the expulsion of the Peisistratidæ, is followed by what properly constitutes the principal part of the work, and the history of the Persian war now runs on in an uninterrupted stream until the taking of Sestos. There are English translations of his history by Beloe, Cary, and Rawlinson, the last being accompanied by important notes and dissertations.

Heroes, a name applied by the Greeks to mythical personages who formed an intermediate link between men and gods. They were demigods, whose mortal nature only was destroyed by death, while the immortal ascended to the gods. The heroic age of Greece is considered to have terminated with the return of the Heraclidæ into the Peloponnesus (B.C. 1100). There were six great heroic races, descended respectively from Prometheus and Deucalion, Inachus, Agenor, Danaus, Pelops or Tantalus, and Cecrops. Individual families, as, for instance, the *Æacidæ*, *Atridæ*, *Heraclidæ*, belong to one or another of these races. Great sacrifices were not offered to the heroes, as they were to the Olympian deities; but groves were consecrated to them, and libations poured out on their sepulchres.

Hérold, LOUIS JOSEPH FERDINAND, a French musical composer, born 1791, died 1833. He entered the conservatoire at Paris, afterwards studied at Rome, and became musical tutor to the daughters of Murat, king of Naples. His first successful opera was Les Rosières, produced in 1817. This was followed by, among other minor compositions, Le Muletier (1823), and Marie (1826). His chief works, however, are the famous Zampa (1821), and the Pré aux Clercs (1832).

Heron, the common name of birds of the genus *Ardea*, constituting with the bitterns the family Ardeidæ, type of what is now commonly regarded as a separate order of



Common Heron (*Ardea cinerea*).

birds, the Herodiones. The herons are very numerous, and almost universally spread over the globe. They are distinguished by having a long bill cleft beneath the eyes, a compressed body, long slender legs naked above the tarsal joint, three toes in front, the two outer united by a membrane, and by moderate wings. The tail is short, rounded, and composed of ten or twelve feathers. The common heron (*Ardĕa cinerĕa*) is about 3 feet in length from the point of the bill to the end of the tail, builds its nest in high trees, many being sometimes on one tree. Its food consists of fish, frogs, molluscs, mice, moles, and similar small animals. It has an insatiable voracity, and digests its food with great rapidity. It haunts fresh-water streams, marshes, ponds, and lakes, as also the sea-shore. It was formerly in high esteem for the table, and, being remarkable for its directly ascending flight, was the special quarry pursued in falconry

by the larger hawks. The great heron (*A. herodias*) is an inhabitant of America, and is called also great blue heron; the great white heron or egret (*A.* or *Herodias alba*) belongs to Europe; and the green heron (*A. virescens*), the flesh of which is much esteemed, is a native of North America.

He'ron. See *Hero.*

Herpes, a skin disease which, in most of its forms, passes through a regular course of increase, maturation, decline, and termination, in from ten to fourteen days. It is characterized by vesicles which arise in distinct but irregular clusters, and commonly appear in quick succession, and near together, on an inflamed base; generally attended with heat, pain, and considerable constitutional disorder. The term includes shingles and the like. The name herpes is given from the tendency of the eruption to creep or spread from one part of the skin to another (Greek *herpein*, to creep).

Herpetology (from Gr. *herpeton*, a reptile), that department of natural history which treats of reptiles. See *Reptiles.*

Herre'ra, FRANCESCO, one of the greatest painters of the Seville school, was born there about 1576, died at Madrid 1656. He designed with spirit and vigour, and may justly be regarded as the founder of a new national school. His Last Judgment is a master-piece of design and colouring. Equal praise is due to his Holy Family and the Outpouring of the Holy Spirit. He also displayed much skill in fresco painting and bronze work.—His youngest son, FRANCESCO, surnamed *El Mozo*, born 1622, died 1685. He gained a great reputation in oil-painting and fresco, and became principal painter to Philip IV.

Herrick, ROBERT, an English poet, born in London, 1591, died in Oct. 1674. He was vicar of Dean Prior in Devonshire for about 20 years; suffered deprivation under the government of Cromwell; but recovered his benefice after the restoration of Charles II., in 1660. His compositions were published in 1648, under the title of Hesperides, or the Works, both Humane and Divine, of Robert Herrick. It is a delightful collection of love lyrics, epigrams, sketches of rural scenery, &c. Notwithstanding his frequent coarseness he has been pronounced a writer of delightful Anacreontic spirit, and the best of English lyric poets.

Herring, the general name of fishes of the genus *Clupĕa*, the most important of which is the *Clupĕa harengus*, or common herring. It is of wide distribution in the North Atlantic, 45° N. lat. being about the southern limit. It measures from 10 to 12 inches in length, with blue-green back and brilliant silvery white under parts. It has small teeth in both jaws, and is of an elegant shape, the body being much compressed. It was formerly supposed that the herrings migrated in two great shoals every summer from the Polar Seas to the coasts of Britain and France, returning in the winter, but the migration is probably only from a deeper part of the ocean to a shallower. The feeding ground of the herring is probably the mud deposits found in the deeper parts of the sea, and it seems to be a fact that during their visits to the shallower waters of the coast for the purpose of spawning they do not feed, or feed very little. In summer the herring leaves the deep water where it has passed the winter and spring months, and seeks the coast where it may deposit its ova, and where they may be exposed to the influences of oxygen, heat, and sun-light, which are essential to their development. They are generally followed by multitudes of hakes, dog-fishes, &c., and gulls and other sea-birds hover over the shoals. They swim near the surface, and are therefore easily taken by net. So great is their fecundity that the enormous number taken appears to produce no diminution of their abundance, as many as 68,000 eggs having been counted in the roe of one female. Herrings are taken throughout the year, but in the greatest quantities in summer. In Scotland the herring fishery is one of the most important industries. The regular fishing begins in May at the Hebrides, in July on the northern coasts, and during August, September, and October along the east coasts of Scotland and England. The mode of fishing most common to Scotland is with the drift-net. A series of nets with meshes about an inch square are joined together on a long rope, the nets being marked by floating corks or bladders, and the united nets are sunk by leaden weights. They thus stand across the path of the fish, which are enmeshed by their gills. Trawling or seine-net fishing is also practised. In Scotland the catch of herrings is generally measured by the 'cran' = 45 gallons; a large proportion are cured or pickled, but great quantities are also disposed of fresh. There are upwards of 7000 boats engaged in the Scotch fishery, with an aggregate of 230,000,000 sq. yards of netting. The an-

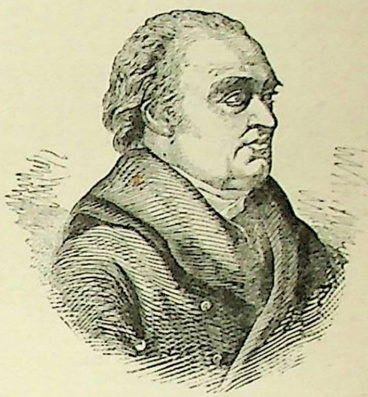
nual value of herrings cured in Scotland is usually over £1,000,000. Other prominent members of the herring family (Clupeidæ) are the sprat or garvie (*Clupĕa sprattus*), the pilchard or gypsy herring (*C. pilchardus*), the whitebait, anchovy, &c.

Herrnhut, a village of Saxony, 50 miles E. of Dresden. It was founded by Count Zinzendorf in 1722, for the Moravian Brethren, and it afterwards became the metropolis and centre of that sect of Christians, who, from this town, are often called *Herrnhuters*. See *United Brethren*.

Herschel, Caroline Lucretia, sister of the astronomer Sir William Herschel, born at Hanover 1750, died 1848. She joined her brother at Bath in 1771, and acted during his life as his astronomical assistant. She also found time to conduct a series of observations of her own. Her observations were published by the Royal Society, of which she was made an honorary member. On her brother's death she returned to Hanover.

Herschel, Sir John Frederick William, only son of Sir William Herschel, was born in 1792 at Slough, near Windsor, died in 1871. In 1813 he graduated B.A. at Cambridge, and was Senior Wrangler and Smith's Prizeman. After his father's death he spent eight years reviewing the nebulæ and clusters of stars discovered by his father. The results were given in 1833 to the Royal Society in the form of a catalogue of stars. The catalogue contained observations on 525 nebulæ and clusters of stars not noticed by his father, and on a great number of double stars, between 3000 and 4000 in all. In 1830 he produced his excellent Preliminary Discourse on the Study of Natural Philosophy, and about the same time published several treatises in the Encyclopædia Metropolitana, Lardner's Cyclopædia, &c. In 1834 he established, at his own expense, an observatory at Feldhuysen, near Cape Town, his object being to discover whether the distribution of the stars in the southern hemisphere corresponded with the results of his father's labours in the north. He returned to England in 1838, and in 1847 was published Results of Astronomical Observations made during 1834–38 at the Cape of Good Hope, being the Completion of a Telescopic Survey of the Whole Surface of the Visible Heavens. He was one of the earliest pioneers in photography; was made a D.C.L. of Oxford; and on the queen's coronation he was created a baronet. In 1848 he was president of the Royal Astronomical Society, and in 1850 was appointed Master of the Mint, an office which he resigned in 1855. Among Sir John's other works are Outlines of Astronomy, Familiar Lectures on Scientific Subjects, and a translation of the Iliad in verse.

Herschel, Sir William, astronomer, son of a musician of Hanover, born 1738, died 1822. He came to England in 1757, and was employed in the formation of a military band, and in conducting, while organist at

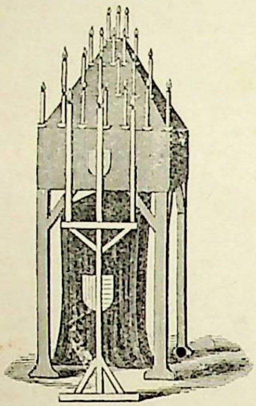


Sir William Herschel.

Bath, several concerts, oratorios, &c. Although enthusiastically fond of music, he had for some time devoted his leisure hours to the study of mathematics and astronomy; and being dissatisfied with the only telescopes within his reach, he set about constructing instruments for himself. Late in 1779 he began a regular survey of the heavens, star by star, with a 7-feet reflector, and discovered, March 13, 1781, a new primary planet, named by him the *Georgium Sidus*, but now known as *Urănus*. This discovery extended his fame throughout the world, and brought him a pension of £400 a year, with the title of private astronomer to the king. Assiduously continuing his observations, he measured the rotation of Saturn, discovered two of its satellites, and observed the phenomena of its rings. He also discovered the satellites of Urănus, and observed the volcanic structure of the lunar mountains. At Slough, near Windsor, he erected a telescope of 40 feet length, and completed it in 1787. Herschel received

much assistance in making and recording observations from his sister Caroline; and latterly his brother, a skilful optical instrument maker, lent him valuable aid. In 1802 he laid before the Royal Society a catalogue of 5000 nebulæ and clusters of stars which he had discovered. He was made D.C.L. by the University of Oxford, and in 1816 was knighted.

Herse, HEARSE, a framework whereon lighted candles were placed at the obsequies of distinguished persons. The funeral herse of the middle ages was a temporary canopy



Herse.—MS. in Bodleian Library.

covered with wax-lights, and set up in the church; the coffin was placed under the herse during the funeral ceremonies. Sometimes it was a very elaborate structure. The name has been transferred to the modern carriage for bearing a dead body to the grave.

Hersfeld, a town of Prussia, province of Hesse-Nassau, 10 miles N.N.E. of Fulda. Pop. 7262.

Herstal, or HERISTAL, a town of Belgium, on the Meuse, 3 miles north-east of Liége. It was the residence of Pepin le Gros, and afterwards of several French kings of the second race; and has a church founded by Charlemagne. Pop. 12,015.

Hertford, town and former parl. borough of England, capital of the county of same name, on the Lea, 19 miles north of London. It consists of three principal streets, meeting in a central square. There are breweries and oil and flour mills. Hertford now gives name to a parl. div. of the county. The castle, which was built by Edward the Elder about 905, was occupied by John of Gaunt, and by the queens of Henry IV., V., and VI.; and Elizabeth also resided in it occasionally. John II., king of France, and David, king of Scotland, were both in captivity here. Pop. 7548.—The county of HERTFORD (contracted HERTS), is bounded by Cambridgeshire, Essex, Middlesex, Buckingham, and Bedford; area, 405,141 acres, of which about five-sixths are arable, meadow, and pasture. The general aspect of the county is pleasing, being diversified by hill and valley, pasture lands, arable farms, and picturesque parks and woods. The principal rivers are the Lea and Colne, both of which have numerous tributaries. Agriculture employs a large number of the inhabitants; there are manufactures of paper, silk, and straw. For parliamentary purposes it forms four divisions, each returning a member to the House of Commons. Pop. (1891), 220,125.

Hertogenbosch. See *Bois-le-Duc.*

Hertz, HENRIK, Danish dramatic poet, was born at Copenhagen of Jewish parents, 1798, died 1870. He published several comedies anonymously in 1826–30. Poetical Epistles from Paradise, in which he imitated and satirized the affected style and spirit of his contemporaries, raised a great commotion at the time. He wrote a great number of poems and novels, but his best works are his plays. Among his best known are Sparekassen, Ninon, Svend Dyring's Huus, a tragedy founded on an old saga, and King René's Daughter, which has been translated and performed in France, Germany, and Britain.

Her'uli, an ancient Germanic people, originally found on the northern shores of the Black Sea. Under the leadership of Odoacer they helped in the overthrow of the Western Empire. About the end of the 6th century they ceased to have a separate existence as a people.

Her'vey, JAMES, English divine, born in 1714, died 1758. Having taken orders he filled curacies in Hampshire and Devonshire, and in 1743 he became curate to his father, at whose death he succeeded to the livings of Weston Favel and Collingtree. His works, which had a great popularity notwithstanding their turgid and meretricious style, include Meditations among the Tombs; Reflections in a Flower Garden; a Descant on Creation; Contemplations on the Night and Starry Heavens; Theron and Aspasia, religious dialogues; and a volume of Letters.

Hervey Islands, a group of islands in the Pacific Ocean, s.w. of the Society Islands, lat. 20° s., lon. 160° w., consisting of nine islands, either volcanic or coralline, the largest being Raratonga. The natives have legends of their migration from Samoa, and many have been converted to Christianity. Now under British protection. Pop. about 8400. Called also COOK'S ISLANDS.

Herzegovina (hert-se-go-vē'nä), a province of the Balkan peninsula, now under the Austrian sway, bounded on the N. by Croatia and Bosnia, on the E. by Novibazar, on the S.E. by Montenegro, and on the S. and W. by Dalmatia; area, 700 square miles. The surface is generally mountainous, but contains many fertile valleys. Pop. about 200,000. An insurrection which broke out in July, 1875, formed the beginning of a train of events resulting in war between Russia and Turkey. In accordance with the Treaty of Berlin (1878) the province was occupied by Austrian troops, and is now ruled by an Austrian military governor.

Herzen (hert'sen), ALEXANDER, a Russian writer, born in 1812 at Moscow, died at Paris 1870. While a student at Moscow he imbibed extreme philosophical and socialistic views, which brought about his imprisonment and exile. He was afterwards pardoned, but spent the latter part of his life (from 1847) abroad. Among his numerous works are the novels, Who is to Blame? and Dr. Krupow; Letters from France and Italy; On the Development of Revolutionary Ideas in Russia; Recollections of my Lifetime; Memoirs of the Empress Catharine, &c.

Herzog (hār'zōh), JOHANN JAKOB, German Protestant theologian, born at Basel 1805, died at Erlangen 1882. He was successively professor of historical theology at Lausanne, church history at Halle, and latterly at Erlangen. His chief works are Calvin and Zwingli, Life of Œcolampadius and the Reformation in Basel, and his great Real-Encyklopädie für Protestantische Theologie und Kirche, a vast collection of German learning and speculation, of which he was the editor, and to which he contributed over 500 articles.

He'siod, one of the oldest poets of Greece, belonging to the 8th century B.C., and connected with Ascra, a village of Bœotia, at the foot of Mount Helicon. Little is known of his life. Of numerous works attributed to him there only remain the Theogony, a collection of the oldest fables concerning the birth and achievements of the gods; the Shield of Heracles, a fragment of a larger work; and a didactic poem, Works and Days, which treats of agriculture, the choice of days, &c., with prudential precepts concerning education, domestic economy, &c.

Hesper'ides (-dēz), in Greek mythology, certain nymphs who lived in gardens, of rather uncertain locality, as guardians of the golden apples that grew there, being assisted in the charge by a dragon. Hesiod places the gardens in an island of the ocean far to the west. It was the eleventh labour of Heracles to kill the dragon and bring the golden apples of the Hesperides to Eurystheus.

Hesperor'nis, a fossil bird found in the chalk formation of Kansas, about 6 feet long, without wings, and having its jaws armed with teeth, which are not set in sockets, but in a common groove. It has been described as 'a kind of swimming, loon-like, raptorial ostrich, without forelimbs, with the gape armed with formidable rows of strong teeth like a gigantic lizard, and with a large, broad, and flattened tail like a beaver.'

Hes'perus, among the ancient Greeks, a name of the evening star (the planet Venus).

Hesse (hes), or HESSEN, anciently a territory of Germany, situated mainly between the rivers Neckar, Rhine, Main, Lahn, and Fulda. After various fortunes it was ruled by the landgrave Philip I., who succeeded in 1509, and at his death in 1567 divided his dominions among his four sons. The death of two of these, however, reunited the territories in part, so that there remained only the two main divisions of Hesse-Cassel and Hesse-Darmstadt, the latter now known simply as Hesse. See following articles.

Hesse, or HESSEN, GRAND-DUCHY OF, formerly known as *Hessen-Darmstadt*, an independent state of South Germany, consisting of sundry distinct portions. Of the two main portions, one (forming the provinces of Rheinhessen on the left, and Starkenburg on the right bank of the Rhine) lies immediately to the north of Baden, the other, Oberhessen (Upper Hesse), is entirely inclosed by the Prussian province of Hessen-Nassau; area of whole grand-duchy, 2964 sq. miles. Oberhessen is generally mountainous; the provinces Starkenburg and Rheinhessen are also mountainous towards their frontiers, more especially in the southeast, but there are also extensive plains belonging to the valleys of the Main and the

Rhine. The climate is greatly diversified, being cold and bleak in the mountainous districts, and mild and pleasant in the valleys of the Rhine and the Main. Much of the soil, particularly in the provinces of Starkenburg and Rheinhessen, is remarkably fertile. The vine forms a most important object of culture, and fruit is very abundant. The principal towns are Darmstadt, the capital; Mainz, Giessen, Bingen, and Worms. About two-thirds of the inhabitants are Protestants. Pop. 1,031,791.—The Grand-duchy of Hesse originated in the division of the Landgraviate of Hesse in 1567. (See *Hesse.*) In 1806 the landgraviate was erected into a grand-duchy with an enlarged territory by Napoleon. It was reduced to its present limits in 1866, when it had to cede to Prussia some districts in the north, besides Hesse-Homburg, which, after being separated from it since 1596, had been reunited to it in the beginning of the year in which it was ceded. The reigning grand-duke, Ludwig (Louis), was married to Princess Alice of Great Britain.

Hesse-Cassel, or KURHESSEN ('Electoral Hessen'), a district of Germany, formerly an independent electorate, containing 4430 sq. miles, but now, with the exception of several small strips of territory, forming part of the Prussian province of Hessen-Nassau. It was founded in 1567. (See *Hesse.*) The last twenty years of its independent history is simply a narrative of conflicts between the people for political freedom and the elector for absolute rule. At last, on the outbreak of the German war of 1866, the elector declared himself on the side of Austria, and his territory was occupied by Prussian troops. On the conclusion of the war Hesse-Cassel was annexed to the Prussian territories.

Hesse-Darmstadt. See *Hesse, Grand-duchy of.*

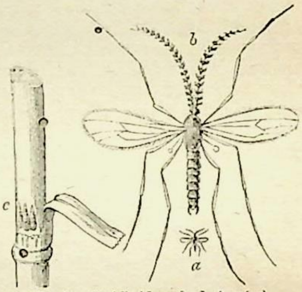
Hesse-Homburg, before its absorption by Prussia after the German war of 1866, a landgraviate of Germany, consisting of two parts, the lordship of Homburg, situated N.N.W. of Frankfort, and the lordship of Meissenheim. It had an area of about 105 square miles, and a population of 27,000 inhabitants. The greater part of the public revenue was obtained from the gaming-tables of the watering-place, Homburg, the capital.

Hesse-Nassau, or HESSEN-NASSAU, a province of Prussia, formed out of the former Principality of Hesse-Cassel, the Duchy of Nassau, the Landgraviate of Hesse-Homburg, the territory and town of Frankfort, &c. It borders on the Prussian provinces of Westphalia, Hanover, Saxony, and the Rhineland, the Kingdom of Bavaria, &c., and incloses Upper Hesse. (See *Hesse, Grand-duchy of.*) The boundary is partly formed by the Rhine, Main, Weser, and Werra. Other rivers are the Lahn and Fulda. The greater part of this province belongs to the central German plateau, and has a rugged surface, partly covered by branches of the Harz. Still, about 40 per cent of the whole is arable, while about the same is under wood. The chief mineral is iron. Mineral springs are numerous. The manufactures consist chiefly of woollens, cottons, and linen. The principal towns are Cassel, the capital, Wiesbaden, and Frankfort. Pop. 1,664,426.

Hessian, a stout coarse cloth made of hemp, or of hemp and jute.

Hessian Boots, a kind of high boots with tassel in front, worn over tight trousers, in fashion with military gentlemen in the 18th century.

Hessian Fly (*Cecidomyia destructor*), a fly of the family Tipulidæ, of the order Diptera (two-winged flies), the larva of which is very destructive to wheat, barley, and rye crops (it does not attack oats). It is so named from the unfounded belief,



Hessian-fly (*Cecidomyia destructor*).
a, Male (natural size). *b*, Male (magnified). *c*, Pupæ fixed on the joint of the wheat-stalk.

prevalent in America, where it is specially destructive, that it was brought over to that country in the baggage of the Hessian mercenaries employed against the Americans in the war of Independence. The female fly is about the eighth of an inch in length, with a wing expanse of about a quarter of an inch. Its body is brown, with the upper parts, the thorax, and the head of a darker shade, approaching to black. The wings are

of a dusky gray, and are surrounded with fringes. The male is somewhat smaller than the female and has longer antennæ. The female flies usually lay their eggs on the young plants twice in the year, in May and September, out of which eggs the maggots hatch in from four to fourteen days. These work themselves in between the leaf-sheath and the stem, and fix themselves near the lowest joints, often near the root, and suck the juices of the stem, so that the ear falls down at a sharp angle. These maggots turn to pupæ, from which the flies develop in about ten days. It has long been a pest in America and Germany, but did not appear in Britain till the summer of 1886.

Hestia, one of the later Greek goddesses, equivalent of the Latin Vesta.

Heteral'ocha. See *Huia-bird.*

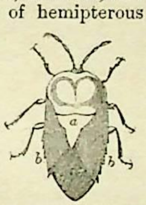
Heterocer'cal, a term applied to ganoid and elasmobranchiate fishes, in which the vertebral column runs to a point in the upper lobe of the tail, as in the sharks and sturgeons, causing this lobe to be much larger than the other.

Heterogen'esis, a term sometimes used as equivalent to spontaneous generation; otherwise applied to alternate generation. See *Generation.*

Heteroousians (het-e-ro-ou'zi-anz), in eccles. hist. a branch of the Arians who held that the Son was of a different substance from the Father. See *Homoousians.*

Heterop'oda, an order of marine molluscs, the most highly organized of the Gasteropoda. In this order the foot is compressed into a vertical muscular lamina, serving for a fin, and the gills, when present, are collected into a mass on the hinder part of the back. The chief genera are *Carinaria* and *Firŏla.*

Heterop'tera (Gr. *hetĕros*, different, and *pteron*, a wing), a section of hemipterous insects comprising those in which the two pairs of wings are of different consistence, the anterior part being horny or leathery, but generally tipped with membrane. They comprise the land and water bugs. By some naturalists the Heteroptera are separated from the Homoptera (the other section of the Hemiptera), and raised into a distinct order.



Heteroptera—*Tessaratoma Sonerattii.* *a*, the scutellum; *b*, hemelytra.

Hetman, or ATAMAN, the title of the head (general) of the Cossacks. This dignity was abolished among the Cossacks of the Ukraine by Catharine the Great, and although the Cossacks of the Don still retain their hetman, the former freedom of election is gone, and the title of chief hetman is now held by the Russian heir-apparent to the crown.

Heuglin (hoi'glin), THEODOR, BARON VON, German traveller, born 1824, died 1876. He became first known by his travels in the region of the White Nile and Abyssinia (1854); took part in the German expedition of 1861–62 to the Egyptian Soudan; and afterwards accompanied Mdme. Tinné in her expedition to the Upper Nile. In 1870–71 he made a journey to the region of Spitzbergen and Nova Zembla, and in 1875 a last journey to the shores of the Red Sea. He published several volumes of African travel and natural history.

Hex'achord, in the ancient music, an interval of four tones and one semitone, equivalent to that which the moderns call a *sixth.*

Hex'agon, a plane figure of six sides and six angles. When these lines are equal the figure is called *a regular hexagon.*

Hexahe'dron, a figure having six faces, or a solid bounded by six planes. The term cube is now generally applied to the *regular hexahedron.*

Hexam'eter, a verse of six feet, the heroic or epic measure of the Greeks and Romans. The sixth foot is always a spondee (two long syllables) or a trochee (a long and a short). The five first may be all dactyls (two short syllables and one long), or all spondees, or a mixture of both. The scheme of this verse then is—

— ◡◡ | — ◡◡ | — ◡◡ | — ◡◡ | — ◡◡ | — ⏓
or, — — | — — | — — | — — | — — | — ⏓

with all the varieties which the mingling of the two kinds of feet affords. In modern poetry the hexameter has been frequently used. In English hexameters accent is almost entirely substituted for length, and trochees generally take the place of spondees. Longfellow in his Evangeline, Kingsley in his Andromeda, and Clough in his Bothie have adopted this form of verse. The following lines are specimens of Clough's English hexameters:—

O let us | try, he | answered, the | waters them | selves will sup | port us, |
Yea very | ripples and | waves will | form to a | boat under | neath us.

Hexan'dria, in the Linnæan system of botany, a class of plants having six stamens, which are all of equal or nearly equal length.

Hex'apla (Greek, *hexapla*, 'six-fold'), a collection of the Holy Scriptures in six languages; applied particularly to the combination of six versions published by Origen, containing the Hebrew text with a transcript of it in Greek characters, the Septuagint, and three other versions, those, namely, of Aquila, Symmachus, and Theodotion. It is only extant in fragments.

Hex'astyle, in architecture, a term applied to a portico or temple which has six columns in front.

Hexham, a town of England, in Northumberlandshire, on the Tyne, about 20 miles west from Newcastle. There are here ruins of an abbey church, originally a cruciform structure, built about 674, destroyed two centuries later by the Danes, renovated in 1113, and demolished by the Scots in 1296. Hats, gloves, and leather are manufactured, but the industries are chiefly agricultural. Hexham gives name to a parl. div. of the county. Pop. 5932.—The BATTLE OF HEXHAM, fought 15th May, 1464, was one of those belonging to the wars of the Roses. The Lancastrians under Somerset were defeated by Montague, the former being slain.

Heydeck, KARL WILHELM VON (sometimes called *Heidegger*), Bavarian landscape painter, born at Saaralben in Lorraine 1788, died at Munich 1861. He entered the military academy at Munich in 1801, and rose to the rank of lieutenant-general. He served as a volunteer in the Peninsular campaign, and took an active part in the Greek war of independence. His pictures are numerous, the more important being preserved at Berlin and Munich. Among them are Tyrolean Wood-cutters, The Lion Gate at Mycenæ, The Ascent to the Acropolis, &c.

Heylin, PETER, D.D., English theologian, born 1600, died 1662. He published his Microcosmos, or Description of the Globe, in 1625. In 1629 he became chaplain to Charles I., and obtained several benefices, from which he was ejected during the civil war. At the Restoration he was made subdean of Westminster. He wrote a Life of Laud, a Defence of the Church of England, and several theological works.

Heyne (hī'nė), CHRISTIAN GOTTLOB, German scholar, born 1729, died 1812. He was educated at Chemnitz and at Leipzig University, and after a long struggle with poverty he received, in 1763, an invitation to become professor of eloquence and poetry at Göttingen. He was soon after (1764) appointed first librarian, and remained here till his death. He particularly applied himself to classical criticism and the illustration of the writings of the ancients, and published valuable editions of Homer, Pindar, Diodorus Siculus, Epictetus, Virgil, Tibullus, &c., all with full commentaries.

Heyse (hī'zė), PAUL JOHANN LUDWIG, German novelist and dramatist, born at Berlin 1830, settled at Munich in 1854. He has written many plays, and short stories for newspapers and magazines; but his fame rests on his great novels, Die Kinder der Welt (The Children of the World), 1872; and Im Paradiese (The Paradise Club), 1875; generally recognized as among the most powerful and artistic works of modern German fiction.

Heywood, a municipal borough of England, in Lancashire (giving name to a parl. div.), about 8 miles north-west of Manchester. The making of power-looms, iron and brass founding, boiler-making, and all branches of cotton spinning and manufacturing, are extensively carried on. Pop. 23,185.

Heywood, JOHN, an early English dramatist, born in the end of the fifteenth century, died at Mechlin sometime about 1580. Sir Thomas More introduced him at the court of Henry VIII., with whom he became a favourite. His zealous attachment to the Roman Church recommended him to Queen Mary; but this very circumstance rendered him an object of suspicion during the two succeeding reigns, and he found it expedient to retire to the Continent. Heywood's dramatic works may be classed as Interludes, as they stand between the miracle-plays and the drama proper. Among them are: A mery Play betweeen the Pardoner and the Frere, the Curate and Neybour Pratte; The Play of Love; The Four P's; &c. He also wrote epigrams, ballads, &c.

Heywood, THOMAS, dramatist, lived in the reigns of Elizabeth, James I., and Charles I. He was born in Lincolnshire, and educated at Cambridge. He composed wholly or in part 220 different plays. Of these only about twenty-four remain, of which the one most admired is A Woman Killed with Kindness, published in Dodsley's Collection. He was also the author of Great Britain's Troy, An Apology for Actors, and a number of other works.

Hezeki'ah (*Hizkiyah*, generally *Hizkiyahu*, strength of Jehovah), the twelfth, and one of the best of the kings of Judah. He succeeded Ahaz about 717 B.C., and died about

698 B.C. He repressed idolatry, fought successfully against the Philistines, and hoped to become entirely independent of Assyria, but had his fenced cities captured, and was mulcted in a large tribute. About this time Hezekiah had a serious illness from which he miraculously recovered, and celebrated his fresh lease of life in a thanksgiving, preserved in Isaiah xxxviii. Among the ambassadors who came with letters and gifts to congratulate him on his recovery was the viceroy of Babylon, to whom he displayed the royal treasures. For this he received a terrible rebuke, and he was told by Isaiah that from Babylon would come the ruin and captivity of Judah. The greater part of the Scripture records bearing on the reign of Hezekiah is occupied by the two invasions of Sennacherib, and the sudden destruction of the Assyrian army. Hezekiah did not long survive this deliverance.

Hibbert Lectures, a course of lectures founded by Robert Hibbert in 1847 for the promotion of comprehensive learning and thorough research in relation to religion wholly apart from the interest of any particular church or system. The first course was given at Westminster in 1878 by Prof. Max Müller, 'On the Origin and Growth of Religion, as illustrated by the Religions of India.' Subsequent lecturers have been M. Renouf, M. Ernest Renan, Rhys Davids, Kuenen, Pfleiderer, Sayce, &c.

Hibernation. See *Dormant State*.

Hiber'nia, the ancient name of Ireland, applied to it first by Julius Cæsar. Aristotle mentions this island by the name of *Ierne;* Pomponius Mela calls it *Iverna;* Ptolemy, *Iuvernia*.

Hibis'cus, an extensive genus of plants, nat. order Malvaceæ (mallows), chiefly natives of tropical climates. They have large showy flowers, borne singly upon stalks towards the ends of the branches, these flowers having an outer calyx (called the epicalyx) of numerous leaves in addition to the true five-lobed persistent calyx. They are chiefly shrubs, one or two being herbs, and a few attaining the dimension of trees. The species are remarkable for abounding in mucilage and for the tenacity of the fibre of their bark, whence several are employed for many economical purposes in the different countries where they are indigenous. The petals of *H. rosa-sinensis*, a plant with large, handsome, usually red flowers, frequent in greenhouses, are astringent, and used in China as a black dye for the hair and eyes. The handsome flowering shrub known in gardens as *Althæa frutex* is a species of hibiscus (*H. syriacus*). The root of *H. Manihot* yields a mucilage used in Japan as size and to give a proper consistence to paper. The leaves of *H. cannabinus* are eatable, and an oil is extracted from its seeds, while it is cultivated in India for its fibre, and hence known as Indian hemp.

Hiccup, or HICCOUGH, is a convulsive catch of the respiratory muscles, with sonorous inspiration, repeated at short intervals. Though generally a trivial and transient inconvenience, its occurrence in the last stages of acute disease is a grave, and often a fatal symptom. The frequent swallowing of small pieces of ice, or small doses of anti-spasmodic medicines, usually relieves a severe fit.

Hickes, GEORGE, D.D., English divine, philologist, and antiquary, was born 1642, died 1715. He became dean of Worcester in 1683, but of this he was deprived in 1690 for refusing to take the oaths to William III. after the Revolution. He followed the fortunes of James II., and was consecrated suffragan Bishop of Thetford in 1694 by the non-juring Archbishop Sancroft. Of his numerous works the most important are Institutiones Grammaticæ Anglo-Saxonicæ et Mœso-Gothicæ, &c. (Oxon. 1689), and Linguarum veterum septentrionalium Thesaurus Grammatico-Criticus et Archæologicus (Oxon. 1705).

Hick'ory, the name given to several species of timber-trees of the genus *Carya*, belonging to the nat. order Juglandaceæ (walnut). They are natives of North America, and are remarkable for stateliness and general beauty. The wood is heavy, strong, and tenacious, and is used for making carriage-shafts, screws, whip-handles, cogged wheels, &c. The shag-bark (*C. alba*) yields the hickory-nut of commerce, and its wood is very valuable. *C. olivæformis* yields the pecan-nut. The pig-nut or brown hickory is the *C. glabra*, and the swamp hickory is *C. amara*, so called from the bitterness of its nut.

Hidalgo, a Spanish nobleman of the lower class. There were *hidalgos de naturaleza*, of noble birth, and *hidalgos de privilegio*, that is, those on whom the king had conferred nobility, and those who purchased nobility. The title is now obsolete.

Hide, OF LAND. See *Hyde*.

Hides, the skins of animals, either raw or dressed; but the name is more commonly given to the undressed skins of the larger domestic animals, as oxen, horses, &c., the

smaller being called skins. The hide trade is now an important one.

Hieracium. See *Hawkweed.*

Hiera Picra, 'Holy Bitter,' a warm cathartic composed of aloes and canella bark made into a powder and mixed with honey, still a favourite in domestic medicine and veterinary practice.

Hierap'olis, a ruined city of Asiatic Turkey, near the right bank of the Lycus, 121 miles east by south of Smyrna. It was famous for its thermal springs, was the birthplace of Epictetus, and is mentioned by St. Paul in his epistle to the Colossians (iv. 13).

Hi'erarchy (from Gr. *hieros*, sacred, and *archē*, government), sacred government, sometimes the church, sometimes the rule which the ecclesiastical governing body exercised as at once priests and civil magistrates. In the former sense the hierarchy arose with the establishment of the Christian church as an independent society. In the middle ages the papal hierarchy gathered great strength, and the pope became a spiritual monarch, ruling western Christendom with power but feebly limited by princes and councils. A reactionary movement began in the 14th century, and the general tendency of subsequent events has always been to make the civil and hierarchical power more and more independent of each other. The term *hierarchy* as used to denote the governing and ministering body in the church, according to its several gradations, can strictly be applied only to those churches which are ruled by bishops, such as the Roman Catholic Church and the Anglican Church, which also holds the theory of a hierarchical gradation of rank and authority. Both these churches comprise the three orders of bishops, priests, and deacons.

Hierat'ic Writing (Gr. *hieratikos*, sacred), the mode of writing used by the Egyptian priests in their records. See *Hieroglyphics.*

Hi'ero I., ancient Greek ruler or "Tyrant" (that is, absolute monarch) of Syracuse in Sicily, brother of Gelon, whom he succeeded in 478 B.C. He was an enlightened ruler, and a patron of genius and learning. His court became the rendezvous of the most distinguished writers of his time, including Pindar, Æschylus, Bacchylides, Epicharmus, and Simonides. The Hiero of Xenophon contains the finest eulogium of this monarch. He was several times victor in the Grecian games. Pindar has celebrated his victories: several odes of this poet are filled with his praises. Hiero died at Catana, 467 B.C.

Hiero II., King or Tyrant of Syracuse (269–214 B.C.), son of Hierocles, a noble Syracusan, who claimed a descent from the family of Gelon. He was chosen by the soldiers as general in 275 B.C., and recognized as king about 270. In 264 he made an alliance with the Carthaginians against Rome, and thus began the first Punic war. Being defeated by the Romans he made peace by the payment of tribute, and was ever after a faithful and useful ally to them. His subjects enjoyed great prosperity during his reign. Hiero devoted himself to the construction of military machines of all kinds, and ships of great size, under the direction of Archimedes, who lived in Syracuse during this reign.

Hierochloe (hī-ėr-ok'lo-e), HIEROCHLOA. See *Holy-grass.*

Hieroglyphics (from Gr. *hieros*, sacred, and *glypho*, I engrave), a term originally applied to the inscriptions sculptured on buildings in Egypt, in the belief that the writing was confined to sacred subjects, and legible only to the priests. The term has also been applied to picture-writing in general, such as that of the Mexicans and the still ruder pictures of the North American Indians. Three different modes of writing were used by the ancient Egyptians, the *Hieroglyphic*, the *Hieratic*, and the *Demotic*. Pure hieroglyphic writing is the earliest, and consists of figures of material objects from every sphere of nature and art, with certain mathematical and arbitrary symbols. Next was developed the hieratic or priestly writing, the form in which most Egyptian literature is written, and in which the symbols almost cease to be recognizable as figures of objects. Hieratic writings of the third millennium B.C. are extant. In the demotic or *enchorial* writing, derived directly from the hieratic, the symbols are still more obscured. The demotic was first used in the 9th century B.C., and was chiefly employed in social and commercial intercourse. Down to the end of the 18th century scholars failed to find a clue to the hieroglyphic writings. In 1799, however, M. Bouchard, a French captain of engineers, discovered at Rosetta the celebrated stone which afforded European scholars a key to the language and writing of the ancient Egyptians. It contained a trilingual inscription in hieroglyphics, demotic

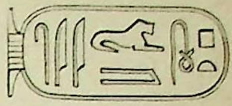
characters, and Greek, which turned out to be a decree of the priests in honour of Ptolemy V., issued in 195 B.C. The last paragraph of the Greek inscription stated that two translations, one in the sacred and the other in the popular Egyptian language, would be found adjacent to it. The discovery of an alphabet was the first task. The demotic part of the inscription was first examined by De Sacy and Akerblad, and the signification of a number of the symbols ascertained. The hieroglyphic part was next carefully examined and compared with the demotic and Greek. At last after much study Champollion and Dr. Thomas Young, independently of each other, discovered the method of reading the characters (1822), and thus provided a clue to the decipherment of the ancient Egyptian writing.

Hieroglyphic characters are either *ideographic*, *i.e.* using well-known objects as symbols of conceptions, or *phonetic*, *i.e.* representing words by symbols standing for their sounds. The phonetic signs are again divided into alphabetical signs and syllabic signs. Many of the ideographic characters are simple enough; thus the figure of a man, a woman, a calf, indicate simply those objects. Others, however, are less simple, and convey their meaning figuratively or symbolically. Water was expressed by three zigzag lines, one above the other, to represent waves or ripples of running water, milk by a milk-jar, oil by an oil-jar, fishing by a pelican seizing a fish, *i.e.* fishing; seeing and sight by an eye; and so on. The nature of the phonetic hieroglyphs, which represent simply sounds, will be understood from an explanation of the accompanying cuts.



Cartouche of Cleopatra, *i.e.* *Kleopatra.*

1. The first hieroglyph in the name of Kleopatra is a knee, which is *kne* or *kle* in Coptic, and represents the K of Kleopatra. K does not occur in the name Ptolemaios. 2. The second hieroglyph in Kleopatra is a lion couchant, which is *laboi* in Coptic, and *labu* in the old Egyptian, and represents the L of both names. In Kleopatra it occupies the second place, and in Ptolemaios the fourth. 3. The third hieroglyph in Kleopatra is a reed, which is *aké* in Coptic and *aak* in the old Egyptian, and represents the E of Kleopatra. The reed is doubled in Ptolemaios and occupies the sixth and seventh places, where it represents the diphthong ai of Ptolemaios. 4. The fourth hieroglyph in Kleopatra is a noose, which represents the O of both names, and occurs in the third place of Ptolemaios. 5. The fifth hieroglyph in Kleopatra is a mat, which represents the P of both names, and is the initial of Ptolemaios. 6. The sixth hieroglyph in Kleopatra is an eagle, which is *akhoom* in Coptic, and represents the A, which is found twice in the name Kleopatra, but does not occur in the name Ptolemaios, although the diphthong *ai* occurs as described above, No. 3. 7. The seventh hieroglyph in Kleopatra is a hand, which is *toot* in Coptic, and represents the T of Kleopatra, but does not occur in Ptolemaios, where it might be expected to occupy the second place. The second place of Ptolemaios is occupied by a semicircle, which is found at the end of feminine proper names, and is the Coptic feminine article T. The researches of Champollion satisfied him of the existence of homophones, or characters having the same phonetic value and which might be interchanged in writing proper names. 8. The eighth hieroglyph in Kleopatra is a mouth, which is *ro* in Coptic, and represents the R of Kleopatra. 9. The ninth hieroglyphic in Kleopatra is the eagle, which is explained in No. 6 above. 10. The semicircle is the T of Ptolemaios, which with 11, the egg found at the end of proper names of women, is a feminine affix. In the name of Ptolemaios there is still the M and the S to account for. The fifth hieroglyph in the cartouche of Ptolemaios is a geometrical figure, consisting of three sides of (probably?) a parallelogram, but now called a hole, because the Coptic *mu* has that signification, and represents the M. The hook represents the S of the word Ptolemaios. Vowels were only regarded by the Egyptians as they were needed to avoid ambiguous writing.



Cartouche of Ptolemy, *i.e.* *Ptolemaios.*

There are groups of hieroglyphs of which one element is an ideographic sign, to which a phonetic complement is added to indicate the pronunciation of the ideographic sign. The words of a text could be written in hieroglyphs in three ways—1. By phonetic hieroglyphs; 2. By ideographic hieroglyphs;

and 3, By a combination of both. According to Ebers, in the perfected system of hieroglyphics the symbols for sounds and syllables are to be regarded as the foundation of the writing, while symbols for ideas are interspersed with them, partly to render the meaning more intelligible, and partly for ornamental purposes, or with a view to keep up the mystic character of the hieroglyphics.

Hieron'ymites, or JERONYMITES, hermits of St. Jerome (Hieronymus), an order of religious persons established in 1374, who wear a white habit with a black scapulary. They possessed the convent of St. Lawrence in the Escurial, and still have convents in Sicily, the West Indies, and South America.

Hieronymus, ST. See *Jerome, St.*

High Altar. See *Altar*.

High Church, a term applied to a party in the Church of England. It was applied first to a party among the younger clergy during the latter part of the reign of Elizabeth who asserted that Calvinism was inconsistent with the ancient doctrine and constitution of the primitive church, and who claimed a divine right for episcopacy. Bishop Andrewes was the chief writer of this party, and Laud became its most active leader. The term now generally refers to those who exalt the authority and jurisdiction of the church, and attach great value to ecclesiastical dignities and ordinances, being more or less identified with the ritualistic party. See *Ritualism*.

High Commission, COURT OF, an ecclesiastical court created by 1 Eliz. c. i. 1559, by which all spiritual jurisdiction was vested in the crown. Under Charles I. and Laud it assumed illegal powers, and was abolished in 1641.

High Court of Justiciary. See *Justiciary Court*.

Highgate, a N.W. suburb of London, situated on a hill commanding fine views of the metropolis and the surrounding country, 5½ miles from St. Paul's. Pop. 15,568.

High German, originally the Teutonic dialect spoken in the southern and elevated parts of Germany, as distinguished from Platt Deutsch or Low German, spoken in the northern and more lowland portions of Germany. See *Germany*.

Highland Regiments, regiments in the British army originally raised in the Highlands of Scotland. Their origin is found in certain companies of Highlanders armed by government about 1725–30, for the purpose of keeping order in the Highlands, and called the *Black Watch* from the sombre colours of their tartans. These were embodied as a regiment of the regular army in 1739, the first Highland regiment being the 43d, afterwards the 42d, which has borne a distinguished part in almost all the wars in which Britain has been engaged. Other seven regiments were raised at different times, the 71st and 72d in 1777; the 74th in 1787; the 78th or Ross-shire Buffs in 1793; the 92d or Gordon Highlanders in 1796; the 93d or Sutherland Highlanders in 1800; and the 79th or Cameron Highlanders in 1805. Under the present territorial system the Highland Regiments consist of the Black Watch (Royal Highlanders), 1st bat. 42d Foot, 2d bat. 73d Foot, 3d bat. Royal Perth Militia; The Highland Light Infantry, 1st bat. 71st Foot, 2d bat. 74th Foot, 3d and 4th bats. 1st Royal Lanark Militia; the Seaforth Highlanders (Ross-shire Buffs, Duke of Albany's), 1st. bat. 72d Foot, 2d bat. 78th Foot, 3d bat. Highland (Rifle) Militia; the Queen's own Cameron Highlanders, 1st. bat. 79th Foot, 2d bat. Highland Light Infantry Militia; the Gordon Highlanders, 1st bat. 75th Foot, 2d bat. 92d Foot, 3d bat. Royal Aberdeenshire Militia; Princess Louise's (Argyll and Sutherland Highlanders), 1st bat. 91st Foot, 2d bat. 93 Foot, 3d bat. Highland Borderers Militia, 4th bat. Royal Renfrew Militia. Each regiment has its own distinctive tartan, some retain the kilt, others wear trousers. There are also several Highland volunteer regiments which are brigaded with the various corps above mentioned.

Highlands of Scotland, a somewhat vague and indefinite geographical division of Scotland, N. and W. of a line running N.E. from Dumbarton on the Clyde through the counties of Dumbarton, Stirling, Perth, Forfar, Kincardine; then N.W. through Aberdeen, Banff, Moray, and Nairn to the shores of the Moray Firth. The Highlands are generally subdivided into two parts, the West Highlands and the North Highlands; the former of which contains the shires of Argyll and Bute, the Southern Hebrides, and part of Perth and Dumbarton; and the latter comprehends the counties of Inverness, Ross, Sutherland, the districts of Athol, Rannoch, and the Isles of Skye, Lewis, and others belonging to Inverness and Ross. The mountainous parts of Banff, Moray, Aberdeen, and Kincardine are also recognized as forming part of the Highlands; while Caithness

(partly) and the Orkney and Shetland Isles are excluded, because their inhabitants are of Scandinavian origin. The whole of the district, which embraces the Celtic-speaking part of Scotland, is wild, rugged, and mountainous, with much grand and picturesque scenery. The western coast is indented by many narrow arms of the sea, and is flanked by numerous islands. Forming, by their natural characteristics, a region distinct from the Lowlands of Scotland, the Highlands were long in a state of political semi-independence, and socially and otherwise—and particularly in retaining the use of the Gaelic tongue—the people have still certain characteristics peculiar to themselves. What especially separated this region from the rest of Scotland, was not only the Celtic language and blood, but also the clan system and all connected with it. See *Clan.*

In the earliest times the Highland chiefs gave allegiance to higher chiefs or princes, by whom the Scottish kings were acknowledged as sovereigns merely in name. Among these native princes were the powerful lords of the Isles, who flourished from very ancient times to the reign of James V. They ruled over all the Western Islands (the Hebrides) from Islay north, and over the western part of the county of Inverness, and as powerful allies exerted an influence over the greater part of the Highlands. In the early part of the 15th century the Highlanders threatened to overrun great part of the Lowlands, but they received a check in the defeat of Donald of the Isles at Harlaw in 1411. From this time onward their incursions on the Lowland parts of Scotland were confined chiefly to occasional plundering raids. In the wars of the 17th century the Highlanders were largely engaged on the side of the Stuarts, and great numbers fought under both Montrose and Dundee. After the suppression of the rising of 1715 a strenuous attempt was made to break up the tribal organization of the Highlanders. An act was passed in 1724 for their disarmament; between 1726 and 1737 great military roads were formed under the direction of General Wade, and a chain of fortified military posts constructed, to overawe the people. The chieftains made every effort to maintain their threatened power, and to destroy the effect of the innovations with which the government sought to weaken the bonds of the clans, but the weakening went on. The rebellion of 1745 gave the government an opportunity of hastening the process, by the abolition of heritable jurisdictions (which see), and of the ancient privileges of the chiefs. A stringent law for disarming the people was passed, and they were even prohibited from wearing their national dress, a prohibition not formally removed till 1782. The great extension of sheep-breeding and the appropriation of large tracts to game have tended much to depopulate some parts of the Highlands. In other parts, notably in some of the Western Islands, the population has increased beyond a point where their circumscribed condition could support them, and much discontent, agitation, and trouble has been the result. (See *Crofters.*) The Highland dress, so well known at the present day, is modern in a good many of its features, and especially so in the great variety of tartans that have been invented, and of which each clan now appears to claim one. In 1891 there were 43,738 persons in Scotland speaking Gaelic only. See also *Highland Regiments.*

Highness, a title of honour given to princes or other persons of rank, used with poss. pronouns *his, her,* &c., and with the addition of *royal, imperial, serene,* applied to the members of royal, imperial, and some German sovereign families.

High Places, in Scripture, eminences or mounds on which sacrifices were offered. Altars and places of worship were erected from the very earliest times on the tops of hills, &c. As such a practice led to idolatrous observances, it was strictly forbidden by the law of Moses. High places are frequently mentioned in conjunction with *groves.*

High-priest, the head of the Jewish priesthood. In the books of Moses the holder of this dignity is simply designated the priest; the epithet *high* occurs on one or two occasions, but as a distinctive epithet it appears to have been added subsequently. The formal consecration of Aaron, the brother of Moses, together with his sons, to a hereditary priesthood, is recorded in Exod. xxviii. The high-priesthood continued in the line of Aaron, sometimes in one, and sometimes in another branch of it, until the coming of Christ. From B.C. 153 till the time of Herod the Great the regal and priestly authority were united in members of the Asmonæan family (the Maccabees). After the subjugation of the Jews the high-priesthood was often arbitrarily conferred by the foreign masters. In the time of our

Saviour it appears to have been held by several priests alternately.

High-seas, the open sea or ocean. The claims of various nations to exclusive rights and superiority over extensive tracts of the ocean-highway have been settled after much controversy by a general international law. The principle now accepted is that the jurisdiction of maritime states extends only for 3 miles, or within cannon range of their own coasts; the remainder of the seas being high-seas, accessible on equal terms to all nations. Inland seas and estuaries, of course, are excepted.

High-treason. See *Treason.*

High-water, that state of the tides when they have flowed to the greatest height; also the time when such flow or elevation occurs. See *Tides.*

Highways. See *Roads.*

Hil'ary, St., one of the early fathers of the church, born at Poitiers, of which city, after his conversion from heathenism, he became the bishop about 350. His contests with the Arians caused his banishment to Phrygia, whence he returned after some years, and continued to distinguish himself as an active diocesan till his death in 367 or 368.

Hilary Term, one of the four English law terms. It begins on the 11th, and ends on the 31st of January: named from the festival of St. Hilary, January 13.

Hilda, Saint, a grand-niece of Edwin, King of Northumbria, born about 614, died 680. At the age of fourteen she was baptized along with her royal kinsman by Paulinus. She was consecrated by Bishop Aidan, and was successively head of the abbey of Hartlepool and of the famous monastery at Whitby. Cædmon, the Anglo-Saxon poet, was attached to the monastery during her rule.

Hildburghausen (hilt'bụr*h*-hou-zn), a town of Germany, in the duchy of Saxe-Meiningen. Pop. 5476.

Hildburghausen, an ancient Saxon duchy united with Meiningen since 1826. See *Saxe-Meiningen-Hildburghausen.*

Hildebrand. See *Gregory VII.*

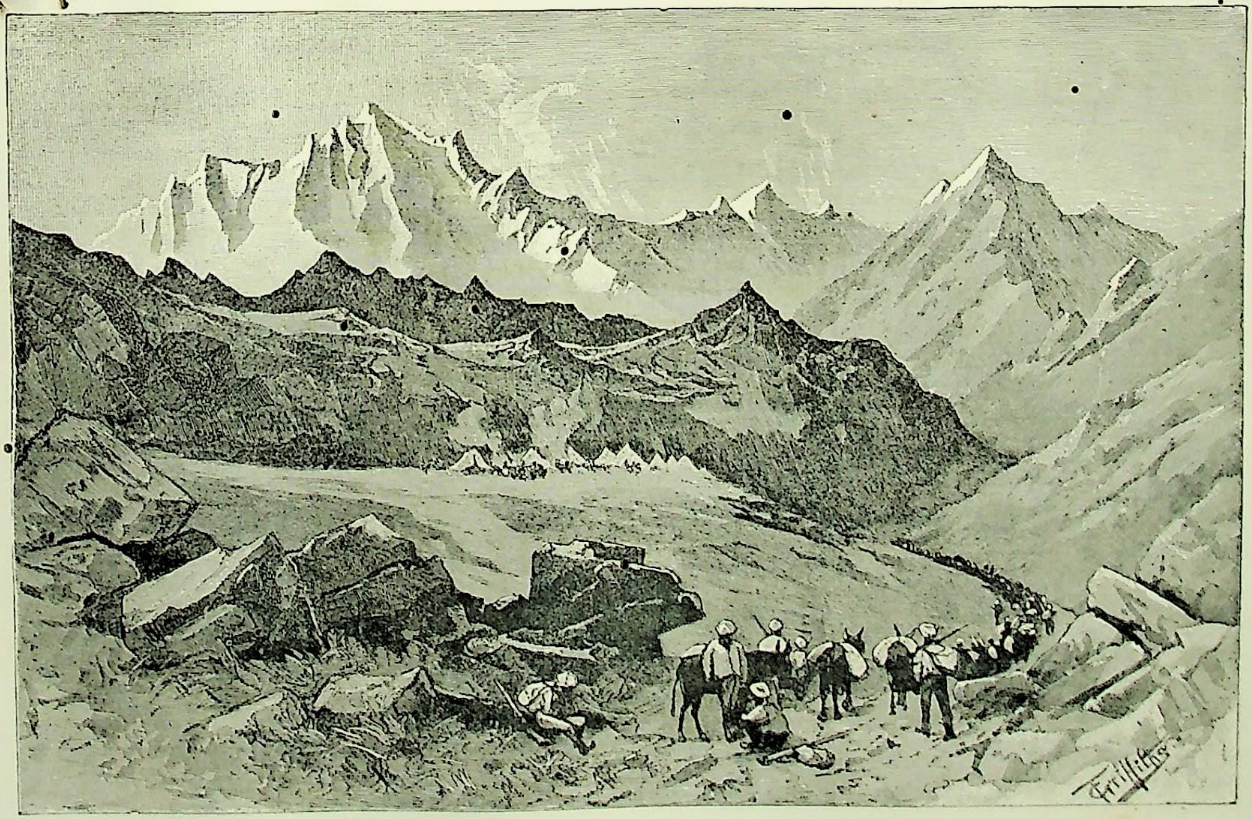
Hilden, a town of Prussia, Rheinland, on the Itterbach, 9 miles E.S.E. of Düsseldorf, with thriving woollen and linen manufactures. Pop. 7946.

Hildesheim (hil'des-hīm), a city of Prussia, prov. of and 20 m. from Hanover, the see of a bishopric, founded by Louis le Debonnaire in 818. It possesses a considerable trade and various industries. Pop. 33,481.

Hill, Sir Rowland, K.C.B., English postal reformer, born at Kidderminster 1795, died 1879. He was engaged as a schoolmaster till 1833, shortly after which he was appointed secretary to the commissioners for the colonization of South Australia. In 1837 he published a pamphlet recommending the adoption of a low and uniform rate of postage throughout the United Kingdom. The scheme was approved by a committee of the House of Commons, which examined its details in 1838, and early in 1840 the penny postage system, which seems to have been originally proposed by Mr. James Chalmers of Dundee, was carried into effect with the assistance of Mr. Hill, who, for this purpose, received an appointment in the Treasury. In 1846 he received a public testimonial of the value of upwards of £13,000. In 1846, he was made secretary to the postmaster-general, and in 1854 chief secretary to the Post Office. In 1860 he became K.C.B. He retired from the Post Office four years later with a pension of £2000, besides a grant of £20,000 voted by parliament.

Hill, Rev. Rowland, popular preacher, notable for his humour and eccentricities, son of Sir Rowland Hill, Bart., of Hawkstone in Shropshire, born 1744, died 1833. He was ordained in the Anglican Church, but embracing the views of the Calvinistic Methodists, he soon began to preach in barns and meeting-houses, and when they were too small or too distant, or not to be procured, in streets, fields, and highways. In 1783 he laid the foundation of Surrey Chapel in the Blackfriars Road, London, where he preached with great success every winter for about fifty years, making summer excursions to the provinces, where his preaching attracted immense crowds. He published sermons and other theological works, of which the best known are his Village Dialogues.

Hill, Rowland (Viscount Hill), British general, nephew of the above, born 1772, died 1842. He entered the army in his sixteenth year, obtained the rank of captain in 1793, and became colonel of the 90th Regiment in 1800. He took part in the Egyptian campaign, and in 1806 was made major-general. He served with great distinction during the campaigns of Moore and Wellington in the Peninsula. In 1809 he became lieutenant-general; in 1812 he was made a K.B.; and in 1814, on being made a peer by the title of Baron of Almarez and



THE HIMALAYA MOUNTAINS—PASS OF KAMRI.

of Hawkstone, parliament voted him a perpetual pension of £2000. At Waterloo he commanded the right wing of the British, and he was personally thanked by Welling-



Viscount Hill.

ton for his services. In 1828 he was appointed general commanding-in-chief of the British army, a post which he held till 1842, when he retired and was made a viscount.

Hillah, a town of Asiatic Turkey, 60 miles south by west of Bagdad, on the Euphrates, among the ruins of ancient Babylon. It has good bazaars, and manufactories of silk and leather. The Euphrates is here crossed by a floating bridge. Pop. 10,000.

Hillel, Jewish rabbi, born at Babylon about B.C. 112. He came to Jerusalem, it is said, at about forty years of age, became president of the Sanhedrim and founder of the school of Hillel. Shammai, another member of the Sanhedrim, became the head of a rival and hostile school. Hillel's party was the more liberal of the two, and became the dominant one.

Hill States, a collective name given to several independent and feudatory states of India. They are situated on the east side of the Sutlej, and comprise about twenty states, including Sirmar, Bilaspur, Bashahr, Gubbul, &c.

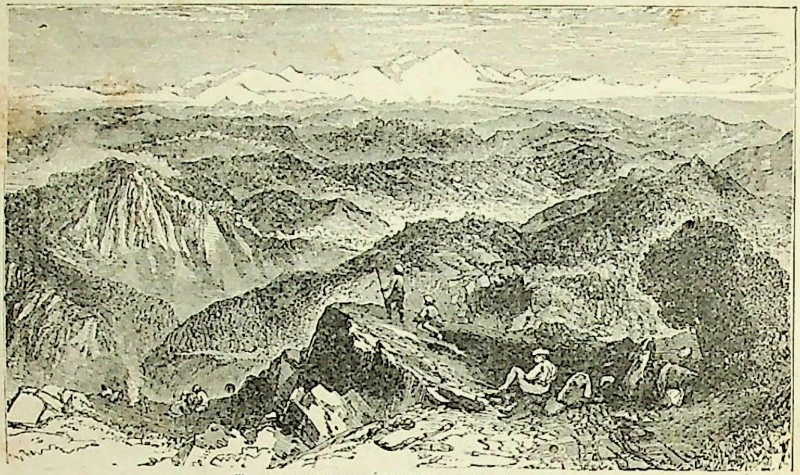
Hill Tipperah, a native state, Hindustan, adjoining the British district of Tipperah, Bengal. The country is hilly, several ranges of hills running parallel from N. to S., with broad intervening valleys. Wild elephants and other large game abound in the forests. The principal crop is rice, and tea is indigenous in some parts of the hills. The government is despotic and patriarchal, and a resident political agent protects British interests. Area, 4086 sq. miles. Pop. 137,442.

Hill Tribes, the name given collectively to the numerous wild tribes inhabiting the mountainous regions of India.

Hilo, the chief town of the island of Hawaii, and the second largest in the Sandwich Islands. Pop. 6000.

Himálaya (Sanskrit, *Himálaya*, the abode of snow), a chain of snowy mountains in Asia, the most elevated on the earth, which separates the Indian Peninsula from the plateau of Tibet, between the 72d and 96th degrees of E. lon., or between the Indus on the west and the Brahmaputra on the east; length about 1500 miles, average breadth about 180 miles. The direction of the Himálaya range from the Indus is for great part of its length from north-west to south-east, after which it curves gradually to the east, or slightly to the north-east. The great plain of India, south of the Himálaya, has a general elevation of 1000 feet above the sea. The transition from this plain to the ascent of the range is marked in the north-west by a belt of dry porous ground broken up into numerous ravines. East of this the *Tarai*, a belt of sloping marsh land, occupies the same position. The *Tarai* is covered with forest and jungle, is crowded with wild animals, and is very malarious. Beyond this lies the *Bhabar*, a belt of a gravelly and sandy nature covered with forests of valuable timber-trees. The *dúns*, *maris*, or *dwars*, longitudinal valleys partly cultivated and partly yielding forest growth, occupy the space between the *Bhabar* and the slope of the Himálayas themselves. The general height of the Himálayas is double that of the Alps; the passes over the former ordinarily exceed, often by half a mile, the elevation of Mont Blanc. The Ibi-Gamin Pass in Garhwal, the highest of all, is 20,457 feet, the Mustagh 19,019 feet, the Parangla 18,500 feet, the Kronbrung 18,313 feet, and the Dura Ghát 17,750 feet high. There are several summits in the Himálaya which approach closely to double the absolute elevation of the highest of the Alps, and 120 of them are stated to be above 20,000 feet. The rivers of the Punjab ('Five Waters') spring from a portion of the great chain which may be considered a distinct group under the title of the North-western

Himálaya. Some of the peaks here rise to a height of 24,000 to 25,000 feet; or to 28,278 feet if the Karakorum is regarded as part of the Himálayas. In the Central or Middle Himálaya rise the sources of the Ganges and Jumna, in a region regarded by the Hindus as holy ground. Farther eastward, in Nepal, is the highest part of the Himálaya, as far as it is known and measured. Dhawalagiri has an elevation of 26,826 feet, the Gaurisankar or Mount Everest, the highest known mountain in the world, is 29,002 feet; the Yassa group rises to the height of 26,680 feet, the Ibjibia group to 26,306. Going farther east, in Sikkim, or on its borders, we find Kanchinjinga, the western peak of which is 28,156 feet high, the eastern, 27,815 feet, while the



The Snowy Range of Himálayas, from Marma.

Kábru ridge rises to 24,015 feet. Sikkim forms a comparatively narrow but interesting territory, walled in on three sides by stupendous mountains from 17,000 to 28,000 feet high. Here terminates the region of the Middle Himálaya, most of the streams from which unite in the Ganges. The Eastern Himálaya, which extends from Sikkim east to the Brahmaputra and completes the chain, sends all its waters to the last-named river, and is all comprised in Bhutan. A little to the east of Sikkim, Chamalari attains the height of 23,944 feet. About 250 miles further east a conspicuous group has been observed with two peaks, named the Gemini or Twins, 21,500 feet high. Thence towards the east the mountains sink rapidly, but the range may be traced beyond the right bank of the Brahmaputra. This stream, as well as the Indus, rises on the little-known north side of the Himálaya, their sources not being far apart. The snowy ridge of the Himálayas, as far as examined, consists everywhere of granite, with which are immediately associated gneiss and mica-slate, followed, in descending, by metamorphic and secondary rocks till we arrive at the more recent alluvial deposits. Earthquakes are still frequent within this region; and hot springs gush forth in abundance, even from beneath the snow. The limit of perpetual snow in the middle division (lon. 78° E.) is stated to be about 15,500 feet on the south side and 18,500 feet on the northern. In Sikkim the snow-line descends on the south side to 14,500 feet, while on the north it rises to a level of 19,600 feet. Immense glaciers exist at various parts. The vegetation of the Himálayas is very rich, there being forests of pine, spruce, silver-fir, and deodar cedar at suitable elevations, with rhododendrons in rich profusion. Among the more characteristic animals are the yak, musk-deer, wild sheep, &c.

Him'era, an ancient Greek town on the N. coast of Sicily, the site of which is near

the modern Termini. Here Gelon and Theron annihilated the army of Hamilcar the Carthaginian (480 B.C.). In 409 B.C. Hannibal, grandson of Hamilcar, razed the town to the ground.

Himyarites, a race or group of races in Arabia, regarded as descendants of Himyar, one of the mythical ancestors of the Arabs. According to tradition they became the dominant race in Yemen about 3000 years before Mohammed, and spread to the Euphrates on the one hand and Abyssinia on the other. Their most flourishing period appears to have been from about 100 B.C. till A.D. 629, when they succumbed to Mohammedanism. The *Himyaritic language*, not now spoken, formed, with the Arabic and Ethiopic, the southern branch of the Semitic family of tongues. During the last hundred years several hundreds of Himyaritic inscriptions have been collected, and deciphered by means of alphabets with the corresponding Arabic letters which had been preserved. The Mahrah tribes of S. Arabia are the direct descendants of the ancient Himyarites.

Hinckley, a town of England, partly in Warwickshire, but mostly in the county of Leicester. It lies 12 miles south-west of Leicester, and contains an ancient church. The staple trade is hosiery, but there are also large boot and shoe factories. Pop. 9638.

Hincmar, Archbishop of Rheims, ecclesiastic and statesman, was born about 806, died at Epernay 882. He was at first a monk in the Abbey of St. Denis. In 845 he was elected archbishop of Rheims, where he exercised extensive political as well as ecclesiastical authority. He was a man of enlightenment, one of the best scholars of his age, and was distinguished as a defender of the liberties of the church. He wrote two treatises on Predestination, and numerous other works.

Hind, the female of the stag, or red-deer. See *Deer*.

Hindi, one of the languages of India, being that form of Hindustani which employs the Devanágari or Sanskrit character. There are many varieties of it.

Hindley, a town of England, in Lancashire, giving name to one of the parliamentary districts of S.W. Lancashire. Cotton manufacture is the chief industry, and coal abounds in the vicinity. Pop. 18,973.

Hinduism. See *Brahmanism*.

Hindu Kush, or INDIAN CAUCASUS, a mountain system of Central Asia. It is generally considered as a continuation of the Himálayas, which it adjoins at the Indus, and then stretches west till it unites with the Ghur Mountains in North Afghanistan. Its culminating point, in the range of Hindu-Koh, to the north of Cabul, is far beyond the limit of perpetual snow, but is not supposed to exceed 20,000 feet. In many features the Hindu Kush resembles the Himálayas proper, though it is lower and destitute of forests.

Hindus, or HINDOOS. See *India*.

Hindustan', the name commonly given to the whole Indian empire, but which properly applies only to the Punjab and the valley of the Ganges. See *India*.

Hindusta'ni, one of the chief languages of India, having various forms or dialects. When written in the Persian character, and containing many Persian words and phrases, it is known as Urdu; another form of it is Hindi.

Hinnom, VALLEY OF. See *Gehenna*.

Hinny, a hybrid, the produce of a stallion and a she-ass. It is smaller and inferior in strength to the mule produced by an ass and a mare, and it is also much less common.

Hio'go, a seaport of Japan, opened to foreign trade in 1860. It is situated on the island of Hondo, on the Bay of Osaka, 40 miles S.W. of Kioto, with which it has railway communication. The trade with the interior is important, and the exports of tea, copper, fish, silk, &c., large. See *Kobe*.

Hiouen-Thsang, Chinese traveller and Buddhist priest, born about A.D. 602, died 664. He wrote travels in India, and translated many Hindu books on Buddhism into Chinese.

Hip, the fruit of the dog-rose or wild-brier. It contains tannin, sugar, citric and malic acids, and is sometimes used in making conserves.

Hip-joint, the joint of the hip, a ball-and-socket joint formed by the reception of the globular head of the femur or thigh-bone into the socket or acetabulum of the os innominatum. For flexion, extension, rotation, and strength combined it is the most perfect joint in the body.

Hipparchus. See *Hippias*.

Hippar'chus, ancient Greek astronomer, was born at Nicæa in Bithynia, and lived about B.C. 160–125. He resided for some time at Rhodes, but afterwards went to Alexandria, then the great school of science. A commentary on Aratus is the only work of his extant. He first ascertained the true

length of the year, discovered the precession of the equinoxes, determined the revolutions and mean motions of the planets, prepared a catalogue of the fixed stars, &c.

Hippa'rion, a fossil genus of the horse family, of the Upper Miocene and Pliocene periods. The members are distinguished by the fact that each foot possesses a single fully-developed toe, bordered by two functionless toes which do not touch the ground, but simply dangle on each side of the central toe. The hipparion was about the size of an ass, one American species being, however, about the size of a goat.

Hip'pias, ruler of Athens, son of Pisistratus, after whose death (B.C. 527) he assumed the government, in conjunction with his brother Hipparchus. The latter being assassinated while conducting a solemn procession to the temple of Minerva, Hippias seized the reins of the government alone, and revenged the death of his brother by imposing taxes on the people, selling offices, and putting to death all of whom he entertained the least suspicion. His tyranny became at last unbearable, and he was expelled from the city B.C. 510.

Hippo, sometimes called *Hippo Regius* to distinguish it from another town of the same name on the Carthaginian coast; an ancient Numidian city, the ruins of which still exist a short distance south of Bona in Algeria. It was the episcopal see of St. Augustine, and was destroyed by the Vandals in 430.

Hippobos'cidæ, a family of dipterous insects, parasitic on birds and quadrupeds. The type is the genus *Hippobosca* or horse-fly.

Hippocam'pus, a genus of fishes, closely allied to the pipe-fishes, of singular construction and peculiar habits; the upper parts have some resemblance to the head and neck of a horse in miniature, which has suggested the name. When swimming they maintain a vertical position their general length is from 6 to 10 inches, and they occur in the Mediterranean and Atlantic.


Hippocampus brevirostris.

Hip'pocras, a medicinal drink, composed of wine (generally a mixture of Lisbon and canary), with an infusion of mixed spices and other ingredients, formerly much used in England, and still common on the Continent.

Hippoc'rates, the most famous among the Greek physicians, the father of medicine, born in the island of Cos B.C. 460. Besides practising and teaching his profession at home he travelled on the continent of Greece, and died at an advanced age B.C. 357, at Larissa, in Thessaly. His writings, which were early celebrated, became the nucleus of a collection of medical treatises by a number of authors of different places and periods, which were long attributed to him, and still bear his name. The best edition is that of Littré (in ten vols. 8vo, Paris, 1839–61). Among his genuine writings are the first and third books on epidemics; the aphorisms; on diet in acute diseases; on air, waters, and localities; on prognostics; on wounds of the head. Hippocrates was one of the first to insist on the importance of diet and regimen in disease. He had remarkable skill in diagnosis, practised auscultation, and taught the doctrine of 'critical days.'


Hippocrates.—Antique bust.

Hippocrene (-krē'nē; 'The Horse's Fountain'), a spring on Mount Helicon, a mountain in Bœotia, consecrated to the Muses, the waters of which possessed the power of poetic inspiration. It is said to have risen from the ground when struck by the hoofs of Pegasus.

Hip'podrome, the Greek name for the public place where the horse and chariot races were held. In Byzantine times the hippodrome at Constantinople acquired great renown, and factions originating in the hippodrome caused perpetual confusion in all departments of the public service. The name is sometimes applied to a modern circus.

Hippogriff, a fabulous animal or monster, half-horse and half-griffin.

Hippol'ytus, in Greek mythology, son of Theseus, whose stepmother, Phædra, fell in love with him, and accused him to his father in order to revenge herself for his indifference. He was put to death, but his innocence being afterwards established, Phædra destroyed herself. See *Phædra*.

Hippolytus, an early Christian bishop and writer, the details of whose history are involved in obscurity. He appears to have lived about the beginning of the 3d century, and is supposed to have suffered martyrdom under Alexander Severus. The most important of his writings is the Philosophumena, a refutation of heresies, discovered in 1842.

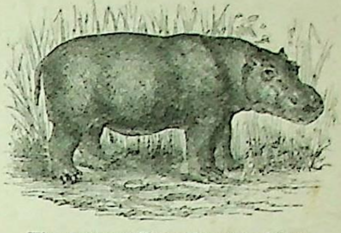
Hippom'ane, a genus of plants belonging to the Euphorbiaceæ. The *H. Mancinella* is the manchineel.

Hippo'nax, a Greek poet, born at Ephesus 540 B.C., of whose works only a fragment of 100 lines remain. He was deformed in person; was banished from Ephesus for his satirical raillery, and lived in extreme poverty.

Hippon'oüs. See *Bellerophon.*

Hippoph'agy, the practice of feeding on horse flesh. Hippophagi was the name given by old geographers to certain nomadic Scythian tribes on the north of the Caspian Sea, who fed on horse flesh. Horse flesh has been eaten for a considerable time in Germany, and it has been regularly sold in Paris since 1866.

Hippopot'amus, the typical genus of a family of Ungulates, of which two living species are known. One species, *H. amphibius,* is of large size, and is common throughout the greater part of Africa; the other, *H. liberiensis,* is not only smaller, but has other important differences, and is found only in the African west coast rivers, and those flowing into Lake Tchad. The former species has a thick and square head, a very large muzzle, small eyes and ears, thick and heavy body, short legs terminated by four toes, a short tail, two ventral teats, skin about 2 inches thick on the back and sides, and without hair, except at the extremity of the tail. The incisors and canines of the lower jaw are of great strength and size, the canines or tusks being long and curved forward. These tusks sometimes reach the length of 2 feet and more, and weigh upwards of 6 lbs. The animal is killed by the natives partly as food, but also on account of the tusks and teeth, their hardness being superior to that of ivory, and less liable to turn yellow. The hippopotamus has been found of the length of 17 feet, and stands about 5 feet high. It delights in water, living in lakes, rivers, and estuaries, and feeding on water-plants or on the herbage growing near the water. It is an excellent swimmer and diver, and can remain under water a considerable time. The *behemoth* of Job is considered by commentators to be the hippopotamus, as the description of his size, manners, food, and haunts is not unlike those

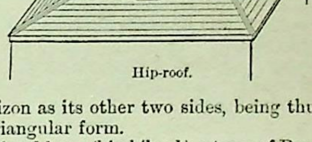


Hippopotamus (*Hippopotamus amphibius*).

of the latter animal. Among the ancient Egyptians it was revered as a divinity, as it is among the negroes in some localities. Several extinct species are found in old-world tertiary and diluvial formations.

Hippurites (-ī'tēz), a genus of fossil bivalves, having the under shell of great depth, and of a conical form, with a flat lid or operculum, occurring in the lower chalk. They are allied to the living Chama, or gaping cockle. The *Hippurite limestone* is an important representative of the cretaceous rocks in the south of France and the Pyrenees, characterized by a large admixture of shells of the family Hippuritidæ.

Hip-roof, a roof, the ends of which slope so as to have the same inclination to the



Hip-roof.

horizon as its other two sides, being thus of a triangular form.

Hirschberg (hirsh'ber*h*), a town of Prussia, province of Silesia, 26 miles south-west of Liegnitz, beautifully situated at the confluence of the Bober and the Zacken. It is well built, and has varied manufactures. Pop. 15,622.

Hispania. See *Spain.*

Hispanio'la. See *Hayti.*

Hissar', a town of Hindustan, in the Punjab, administrative headquarters of district of the same name, on the Western Jumna Canal, 102 miles w. of Delhi. Pop. 17,000. The district has an area of 5163

sq. miles. Pop. 776,006.—Hissar is also the name of a district of Bokhara, having the Hissar chain on the north, and intersected by tributaries of the Oxus. There is also a town Hissar here; pop. 15,000.

Histol′ogy, the study of the tissues which enter into the formation of animals and plants, and their various organs, by means of the microscope and chemical and physical reagents. It may be described as a kind of minute anatomy. It comprehends the structure and mode of development of the various tissues, and is divided into animal histology and vegetable histology.

History (Greek *historia*, from *historeō*, I inquire into) is used by Herodotus in the sense which it has since retained, of a narrative of events and circumstances relating to man in his social or civic condition. A record of bare facts by themselves does not constitute history. Such a record (forming a chronicle or annals) is chronologically valuable; but to attain the dignity of history we must have social events and evolution detailed with considerable fulness, and the growth and movements of society, from one phase to another, distinctly traced and recorded. The modern school of historians devote much attention to the social life of the people; their method being further characterized by the utmost accuracy of research, the extreme importance assigned to contemporary documentary evidence, and careful weighing of data. The field of history proper is so far restricted as to its subject, that only the doings of a community possessing something of an independent organic life can constitute it. History may be conveniently divided into ancient, mediæval, and modern; but these divisions have little scientific value. The first includes the Jewish history and that of the nations of antiquity, reaching down to the destruction of the Roman Empire, A.D. 476; the second begins with 476 and comes down to the discovery of America in 1492, or to the Reformation; the third section extends from either of these eras to our own times. The earliest written history is found graven on the monuments of Egypt, Assyria, &c. These, though of the barest description, have the value of contemporary chronicles. Next come the histories found in the canonical books of the Old Testament; but the real inventors of the artistic form of history were the Greeks.

Hitchcock, Edward, American geologist, born 1793, died 1864. After being for four years minister of a Congregational church at Conway, Massachusetts, he was appointed in 1825 professor of chemistry and natural history at Amherst College, and in 1845 president of the same college, and professor of natural theology and geology. He was connected with the state survey of Massachusetts, Vermont, and part of New York, valuable reports on which he published. He was author of various other works, some geological and some of miscellaneous character. These include Geology of the Connecticut Valley, a highly popular work on Elementary Geology, Illustrations of Surface Geology, Religion of Geology and its Connected Sciences, and Reminiscences, published shortly before his death.

Hitchcock, Roswell Dwight, D. D., LL.D., American theologian, born 1817, died 1887. He entered Andover Theological Seminary in 1838, and was successively professor of natural and revealed religion in Bowdoin, of church history at New York, president of the American Palestine exploration society, and president of Union Theological Seminary. He visited Italy, Greece, Egypt, and Palestine (1866–69), was the author of a Life of Edward Robinson, numerous theological works, hymns, &c.

Hitchin, a market town of England, in Hertfordshire, 34 miles north of London. The parish church, St. Mary's, contains some fine brasses of the 14th, 15th, and 16th centuries, and a fine altar-piece by Rubens. Many females are employed in straw-plaiting, and lavender is largely grown in the vicinity. Pop. 8860.

Hitopadesa (hit-ō-pa-dā′sha; Sanskrit, goodly instruction), an ancient Sanskrit work, taken from an older work called the *Panchatantra* or the five books, the source also of the collection known as the fables of Bidpai or Pilpay. The book consists of fables, one story growing out of another after the eastern fashion, with verses cited from ancient writers by the interlocutors, and was designed for the instruction of princes. It has been translated into many Asiatic and European languages.

Hittites, a Canaanitish nation first mentioned in connection with Abraham, who bought the field and cave of Machpelah from them. There are notices of them in Palestine during and after the captivity. Egyptian and Assyrian inscriptions seem to indicate that the nation consisted of a confederacy ruled by a number of chiefs, and

at one time there was a Hittite empire extending over a large area in Asia Minor and Syria. Their chief territory was in the Orontes Valley.

Hitu'. See *Itu.*

Hivao'a, an island in the South Pacific Ocean, the largest of the south-western group of the Marquesas; 22 miles long east to west; about 10 miles greatest breadth. It is mountainous, and bears indications of volcanic eruptions. Pop. about 6500.

Hive. See *Apiary.*

Hi'vites, a Canaanitish tribe first noticed in Gen. xxxiv. At the conquest of Canaan the main body occupied the northern confines of Western Palestine. Solomon subjected them to a regular tribute.

H'Lassa. See *Lassa.*

Hoadly, BENJAMIN, English prelate, born 1676, died 1761. He was educated at Cambridge; took orders in 1700, and after being settled in London distinguished himself in controversy with Bishop Atterbury and others. A staunch low-churchman, he was appointed Bishop of Bangor in 1715. A sermon preached before the king in 1717 gave rise to the 'Bangorian Controversy' regarding the divine authority of the king and the church. He was translated to the see of Hereford in 1721, to Salisbury in 1723, and Winchester in 1734.

Hoang-Ho, or YELLOW RIVER, a large river in China, the sources of which are in mountains in the Koko-Nor territory, north from Tibet. After a winding course of several hundred miles, it proceeds nearly due north to about lat. 41°; then east for nearly 200 miles, when it suddenly bends round, and flows directly south for about other 200 miles; then turns abruptly east, and flows in that direction till it reaches Lung-men-kau, when it diverges to the north-east, and falls into the Gulf of Pe-che-le about lat. 37° 30′, and lon. 118° 30′. From the 13th century till 1853 the Hoang-Ho entered the sea in lat. 34°, south of the peninsula of Shan-tung, but at the latter date it took its present course. Since then vast sums have been spent in watching and strengthening the banks of the river, which is constantly overflowing at some point. In the autumn of 1887 the whole body of the river burst its banks about 300 miles from its mouth, and flooded about one-sixth of the province of Ho-nan, destroying towns and villages and causing a loss of life, the lowest estimate of which is one million. Its length is estimated at about 2600 miles. It derives its name from the vast quantities of yellow earth held in a state of solution by its waters.

Hoar-frost. See *Frost.*

Hoarhound. See *Horehound.*

Hoarseness, an affection of the throat causing harshness and roughness of voice, due to irregular and imperfect bringing together of the vocal chords, most frequently from swelling of the mucous membrane of the chords, and excessive secretion of mucus in their neighbourhood. It arises from a variety of causes, the most common of which is catarrh or cold. Simple hoarseness is treated with soothing remedies, the inhalation of the steam of boiling water, warm poultices to the neck, &c.

Hoatzin, or HOACTZIN, *Opisthocomus cristatus*, a singular gregarious South American bird, sometimes called the *Crested Touraco*, referred by some naturalists to the family Cracidæ (curassows), order Gallinaceæ; by some made to form an order by itself (Opisthocomi); by others regarded as of the order Insessores, and allied to the plantain-eaters. The plumage is brown streaked with white, and the head has a movable crest. It is of the size of a pheasant, and has an enormous crop with a very small gizzard.

Hobart, up to 1881 HOBART TOWN, the capital of Tasmania, situated at the foot of Mount Wellington (4166 ft.), on the river Derwent, about 12 miles from its mouth. The city is built in the form of a square, the streets crossing each other at right angles. Among the public buildings are the government house, the government offices, the houses of parliament, town-hall, post-office, museum, Episcopal and Roman Catholic cathedrals, and several other places of worship, many public and private schools, the general hospital, &c. There are several jam manufactories, breweries, flour-mills, tanneries, a woollen factory, &c.; and in connection with the shipping interest first-class patent slips. The harbour is easy of access, and has ample depth, capacity, wharf and dock accommodation. Hobart is connected by rail with Launceston. Pop. 33,450.

Hob'bema, MEINDERT or MINDERHOUT, Dutch landscape-painter; born at Amsterdam in 1638, died 1709. He died in poverty, but few facts of his life are known. His paintings consist chiefly of forest scenes, ruins, villages, &c., and are highly valued for their excellence in perspective and colouring. The figures in them were generally painted by others.

Hobbes, THOMAS, English moral and political philosopher, born 1588 at Malmesbury, died 1679. He was educated at Oxford, and afterwards travelled on the Continent as tutor in the Earl of Devonshire's family, becoming acquainted with Gassendi, Descartes, Galileo, &c. He was also intimate with Lord Bacon (some of whose works he translated into Latin), Lord Herbert of Cherbury, and Ben Jonson. From 1637 to 1641 he resided much at Chatsworth, but becoming alarmed at the probability of political commotions, he went to Paris. He stayed abroad some years, and during that time published most of his works. He also taught mathematics to the Prince of Wales (Charles II.), then in Paris, who after the restoration gave him a pension of £100. He spent his latter days with the Devonshire family. The most remarkable of his works is his Leviathan, or the Matter, Form, and Power of a Commonwealth (1651). Other works are De Cive (1642), De Corpore Politico (1650), De Libertate, Necessitate et Casu (1654), and Behemoth, a history of the civil war, published after his death. He also published a metrical version of the Iliad and Odyssey. In the history of the development of freethought in Europe Hobbes holds an important place, and he was one of the first great English writers on government. He conceived the state of nature to be one in which all are at war with each other, and government as the result of a compact, suggested by selfishness, for the sake of peace and protection. Absolute rule was the best form of government, but this is qualified by the assertion that obedience to a ruler is only due so long as he can afford protection to the subject. The philosophy of Hobbes, so depreciated among his contemporaries, has been more or less adopted by Locke, Hartley, Hume, and Priestley, and his ideas on government have formed the foundation of the utilitarianism of the Benthamites.

Hobby. See *Falcon.*

Hobhouse, JOHN CAM. See *Broughton* (*Lord*).

Ho'boken, a city, New Jersey, U.S., on the Hudson river, and close to Jersey City, which stretches immediately to the south. It lies opposite New York, with which it is connected by steam ferries. It has various manufactories, and among the public institutions is the Steven's Institute of Technology, with library and valuable sets of philosophical apparatus. Pop. 43,648.

Hoche (ōsh), LAZARE, general in the French revolutionary war, born 1768. He took service in the French guards when sixteen years old, and at the revolution joined the popular party. He greatly distinguished himself at the siege of Thionville and the defence of Dunkirk, and shortly afterwards, when scarcely twenty-five years of age, received the command of the army on the Moselle. In 1793 he drove the Austrians out of Alsace, and soon after was arrested by the Jacobins and imprisoned at Paris. In 1794 he was released, and appointed commander of the army destined to quell the rising in the west, and afterwards to that in La Vendée. In 1796 he conceived the plan of attacking Britain, by making a descent on Ireland. He accordingly set sail in December from Brest, but the expedition utterly failed, and he was obliged to return without having even effected a landing. After his return he received the command of the army of the Sambre and Meuse. He opened the campaign of 1797 by a bold passage over the Rhine, and had defeated the Austrians in several engagements, when he was stopped in the path of victory by the news of the armistice concluded in Italy. He died suddenly in September, same year (1797).

Hochheim (hō*h*'hīm), a town in Prussia, in the province of Hesse-Nassau, 4 miles E.N.E. of Mayence. It is famous for its wine, called in Germany *Hochheimer*, English, *Hock*. Pop. 2699.

Hochkirch (hō*h*'kir*h*), HOCHKIRCHEN, a village in Saxony, 6 miles E.S.E. of Bautzen, the scene of the surprise and defeat of Frederick the Great, in 1758, by the Austrians under Marshal Daun, in which Marshal Keith was killed; and also of a defeat of the Russians and Prussians by the French in 1813. Pop. 500.

Hochstädt (hō*h*'stet), a town, Bavaria, left bank of the Danube, 23 miles N.W. of Augsburg, the scene of several great battles, of which the most celebrated is that of Blenheim in 1704. (See *Blenheim.*) Pop. 2471.

Hock, the name given to the German wines grown in the Hochheim district (see *Hochheim*). It is a white still wine, but is sometimes rendered sparkling. The name is also loosely applied to all the Rhenish wines.

Hockey, a game at ball known as *shinty* in Scotland, and *hurling* in Ireland. It is played with a club curved at the lower end,

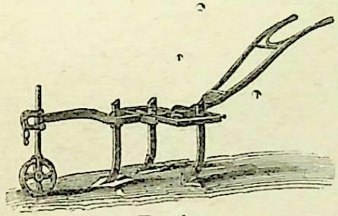
by a number of persons divided into two parties or sides; and the object of each side is to drive the ball into that part of the field marked off as their opponents' goal.

Hodeida, a Turkish seaport of Arabia, on the Red Sea, with an extensive trade in coffee, &c. Pop. 25,000.

Hodge, Charles, D.D., LL.D., theologian, born in Philadelphia 1797, died 1878. He graduated at Princeton College in 1815, and joined the teaching staff of the theological seminary in 1820. He founded the Princeton Review; and is best known by his work on Systematic Theology.—His son Archibald Alexander, D.D., born 1823, died 1886, was a missionary in India, and afterwards professor of theology at Alleghany, Pa., and at Princeton (1878). He wrote several theological works.

Hodom'eter (from Gr. *hodos*, a way, and *metron*, a measure), an instrument for measuring the length of way travelled by any vehicle. It consists of a clockwork arrangement fixed to the side of the vehicle, and connected with the axle. An index records on a dial the distance travelled.

Hoe, an instrument for cutting up weeds and loosening the earth in fields and gardens, in shape something like an adze, being a plate of iron, with an eye for a handle, which is set at a convenient angle with the plate. The Dutch hoe differs from the



Horse-hoe.

common hand hoe in having the cutting blade set like the blade of a spade. A *horse-hoe* is a frame wheel-mounted, and furnished with ranges of shares spaced so as to work in the intervals between the rows of turnips, potatoes, &c. It is used on farms for the same purpose as the hand hoe, and worked by horse-power.

Hof (hōf), a town in Bavaria, Upper Franconia, on the left bank of the Saale, 30 miles N.N.E. of Baireuth. It has woollen, linen, cotton, leather, and paper manufactures. Marble and ironstone are worked in the vicinity. Pop. 21,890.

Hofer, Andreas, Tyrolese patriot, born in 1767. In 1796 he led a rifle company against the French on Lake Garda, and after the Peace of Lunéville took a prominent part in the organization of the Tyrol militia. In 1809 he took the lead in an insurrection of the Tyrolese for shaking off the yoke of Bavaria, to which their country had been transferred by the Treaty of Presburg. In a short time, with intermittent assistance from the Austrians, he defeated the French and Bavarian troops, and nearly the whole country was liberated. Hofer then carried on the military and civil administration, under the most singular circumstances, till the Peace of Vienna was proclaimed. Misled by false reports he commenced hostilities anew, and thus forfeited the protection of the amnesty. He remained concealed for some time, but was at last betrayed to the French, and carried to Mantua, where he was tried by a court-martial and shot, February 20, 1810. His family was indemnified for the loss of their property by the Emperor of Austria in 1819, and his son ennobled.

Hoffman, Charles Fenno, poet and novelist, born at New York 1806, died 1884. He edited the American Monthly Magazine and the New York Mirror; published Greyslaer, a novel; The Vigil of Faith, and other Poems; and a number of songs, &c. During the last thirty years of his life he was afflicted with mental derangement. A complete edition of his poems was published by his nephew in 1874, with a critical introduction by W. C. Bryant.

Hoffmann, August Heinrich, called also Hoffmann von Fallersleben, German lyric poet and philologist, born at Fallersleben in Hanover 1798, died at Corvey 1874. Under the influence of the brothers Grimm he took to investigating old German literature, and became professor of German literature at Breslau in 1835. He also made special studies of Dutch and Silesian literature. He was dismissed in 1842 for the supposed revolutionary tendencies of his songs, and led a wandering life for some years. In 1860 he became librarian to the Duke of Ratibor. He published several volumes of songs, and works on the German Language and Literature.

Hoffmann, Ernst Theodor Amadeus, or, properly, Ernst Theodor Wilhelm, German novelist, born at Königsberg 1776, where he studied law. He afterwards held several minor judicial appointments under

government, and died in 1822, intemperate habits having ruined his health. He cultivated music and art, especially caricature, with success. Among his works of fiction are the Phantasiestücke in Callot's Manier (1814); Die Elixire des Teufels (1816); the Nachtstücke (1817); the Serapionsbrüder (twenty-three tales, 1819, et seq.); Lebensansichten des Kater Murr (1820–22); and many others. In his longer novels he has a strong tendency to make use of supernatural machinery; but his master-pieces are his short stories.

Hofwyl (hof'vil), a village of Switzerland, 6 miles N. of Bern, noted as the seat of the educational institution founded by Fellenberg and Pestalozzi in 1802.

Hog, a general name for the ungulate or hoofed animals of the genus *Sus*, or swine. The head is prolonged into a pointed or truncated snout; the feet have four toes, two of which reach the ground; and the skin is very thick, and mostly covered with stiff bristles. The common hog (*Sus scrofa*), in a tame state, is almost universal, except in very high latitudes. The prevailing colour of the domestic animal is a dull yellowish white, sometimes marked irregularly with black, and sometimes totally black. It is omnivorous in its habits, devouring almost any vegetable or animal substance. It is also very prolific, has usually two litters in a year, a litter consisting of from ten to even twenty. Its flesh forms a material part of the food of mankind, though Jews are strictly enjoined not to eat it, and Mahommedans agree in this prohibition. Port takes salt better than almost any other meat, and hence forms an important article in military and naval stores. The lard of the hog is used in a variety of preparations, and the bristles are used in large quantities in the manufacture of brushes, whilst the skin, when tanned, is used by saddlers, bookbinders, &c. The hog is erroneously looked on as a peculiarly stupid and gluttonous animal; it has also an undeserved reputation for filthy habits, but the too common filthiness of pig-sties is more the fault of the owner than the tenant. It wallows in the mire, but this is a peculiarity of all the pachydermata to cool themselves and provide a protection against insects. The wild-boar, from which most of our domesticated varieties are derived, is found in most parts of Europe and Asia. In size the wild animal considerably exceeds the domesticated hog, the legs are longer and more muscular, and the back therefore much higher. Hunting this animal has always been a favourite amusement, and can still be practised in various parts of Europe. The wild hogs of Hindustan, which afford the amusement of 'pig-sticking' to the British resident there, belong to the species *S. cristātus*, closely allied to the European wild-boar. Another species is found in south-eastern Asia, Java, and various islands, and distinct from it is the Guinea hog of W. Africa, which is also said to have been naturalized in Brazil. As allied to the hog may be mentioned the *Babyroussa*, the genus *Phacochœrus*, or wart-hogs, and the peccaries.

Ho'garth, William, painter and satirical artist, born in London, 1697, died 1764. He was apprenticed to a silversmith, who employed him in engraving ciphers and crests on spoons and pieces of plate. In 1720 he commenced business for himself, painting portraits, and making designs and



William Hogarth.

book-plates for the booksellers, &c. Among these was a series of illustrations to Hudibras. Besides portraits, he also painted miscellaneous subjects in oil. In 1729 he married the daughter of Sir James Thornhill, the painter, against her father's wishes, who is said, however, to have been mollified when Hogarth produced his celebrated series of pictures called the Harlot's Progress, a work which brought his great powers fairly before the public. The engravings of these, which became exceedingly popular, were published in 1734. This was followed by

the Rake's Progress and Marriage à la Mode, two similar series of paintings and engravings; Industry and Idleness, Beer Street and Gin Lane, The Election, The Enraged Musician, The Country-Inn Yard, The March to Finchley, Strolling Actresses Dressing in a Barn, Four Stages of Cruelty, and a host of other engravings, which all evinced his extraordinary powers of satire, wit, and imagination. Several portraits, notably those of himself, Garrick, Lovat, and Wilkes, are master-pieces in their way. He was also ambitious of shining as an historical painter, but in this line he was not so successful. In 1753 his work on the Analysis of Beauty appeared, a treatise which brought him little fame, and which was severely ridiculed by his enemies and professional rivals. In originality of imagination and invention, and for vigour of realism and dramatic power, Hogarth stands in the highest rank, and his genius was always enlisted on the side of virtue and morality. Though best known as an engraver, he possessed high qualities as a painter. The best edition of his works is that published by Boydell (London, 1790), the plates of which, retouched by Heath and others, have been repeatedly published since.

Hog-deer. See *Axis*.

Hog-fish, the popular name given to teleostean fishes of the genus *Scorpæna*, family Scorpænidæ or Triglidæ. The best known species is the *S. scrofa*, common in the Mediterranean, having the head flattened sideways, armed with spines, and adorned with membranous lobes or filaments. It is of a large size and a red colour.

Hogg, James, more familiarly known by the name of the *Ettrick Shepherd*, was born in Selkirkshire in 1770, died at Altrive, on the Yarrow, in 1835. After receiving a very scanty education, he began to earn his bread by daily labour as a shepherd. His early rhymings brought him under the notice of Sir Walter Scott, by whose advice he published a volume of ballads under the title of The Mountain Bard. The failure of an ill-judged agricultural scheme brought him to Edinburgh, where he published the Forest Minstrel (1810), and started a weekly periodical entitled The Spy, which, after a short time, became defunct. The appearance of the Queen's Wake in 1813, with its charming ballad of Kilmeny, established Hogg's reputation as a poet. In 1815 he published his Pilgrims of the Sun, which was followed by Mador of the Moor, the Poetic Mirror (a collection of imitations of living poets), Queen Hynde, and Dramatic Tales, as well as by The Brownie of Bodsbeck, and other prose tales; the Jacobite Relics (partly written by Hogg), &c. From 1817 he had held the farm of Altrive from the Duke of Buccleuch at a merely nominal rent; but his farming schemes never throve, and he was generally in narrow circumstances.

Hog-gum, a resinous substance used for strengthening plasters, and also as a diuretic, laxative, and stimulant medicine. In the West Indies it is employed as a substitute for pitch in tarring boats, ropes, &c. It is apparently the produce of various trees.

Hog-plum, the popular name of the plants belonging to the genus *Spondias*, nat. order Anacardiaceæ. Some of the species yield pleasant fruits, as *S. purpurea* and *S. lutea* of the West Indies, the species generally called hog-plum, because their fruit is a common food for hogs.

Hog-rat, a genus (*Capromys*) of rodent animals, family Muridæ (mice), different species of which, including the musk-cavy, are found in the West Indies.

Hogshead, an obsolete measure of capacity containing 63 old wine gallons, or 52½ imperial gallons. For beer it was 54 gallons, for rum 45 to 50 gallons, for brandy 45 to 60 gallons, and for different kinds. In the United States the measure is still in use, being equivalent to 63 American gallons or 52·485 imperial gallons; for tobacco it varies from 750 lbs. in some states to 1200 lbs. in others.

Hohenlin'den (hō-en-), a village of Bavaria, 20 miles east of Munich, celebrated for the victory gained by the French under Moreau over the Austrians under the Archduke John, December 3, 1800.

Hohenlohe (hō'en-lō-e), formerly a principality of Germany, containing 680 square miles, now chiefly under the sovereignty of Würtemberg, and partly under that of Bavaria.

Hohenstaufen (hō'en-stou-fn), a German princely family, several members of which filled the imperial throne. The founder of the family was Frederick, lord of Hohenstaufen, a castle in the Suabian Alps, who for his services to the Emperor Henry IV. received the duchy of Suabia, and the hand of his daughter Agnes. His son Conrad was elected emperor in 1138. After the death of Conrad (1152) the confidence which was

felt in the Hohenstaufen family caused the choice to fall on his nephew, Frederick III. of Suabia, who was followed by Henry VI. (1190), who added by his wife the kingdom of Sicily and Naples to the hereditary dominions of the family; and he again by Otto IV. (1197) and Frederick II. (1215–50), all belonging to the same house. After the death of Frederick II. his son Conrad was acknowledged as his successor, with the title of Conrad IV., by most of the states of the empire; but Innocent IV. laid him under an interdict, declared him to be deprived of all his lands, and persecuted him with relentless hatred till his death in 1254. The possessions of the family ultimately fell to Bavaria, Baden, and Würtemberg.

Hohenstein (hō'en-stīn), a town in Germany, kingdom of Saxony, 10 miles north east of Zwickau. Pop. 6827.

Hohenzollern (hō-en-tsol'ėrn), a small territory of Germany, since 1852 an administrative division of Prussia. It consists of a long, narrow, irregular strip of country, entirely surrounded by Würtemberg and Baden. Area, 450 sq. miles. Pop. 66,720. The princely family of Hohenzollern dates from Thassilo, Count of Zollern, who died about 800 A.D. There have been several lines and branches, the main one being represented by the present imperial family of Germany.

Hoists. See *Lifts.*

Hokitika, a town of New Zealand (South Island), capital of the province of Westland, and the principal place on the west coast. It owes its rise to being the centre of the productive gold-fields discovered in 1865. Pop. 2178.

Holacanthus. See *Coral Fishes.*

Holbach (hol'bȧ*h*), PAUL HEINRICH DIETRICH, BARON VON, philosopher, born at Heidelsheim, in the Palatinate, in 1723. He was educated in Paris, where he passed the greater part of his life, and died in 1789. He became the patron and associate of the encyclopædists, and contributed many papers on natural history, politics, and philosophy to the Encyclopédie. The principal work attributed to him, which appeared under the name of M. Mirabaud, is the Système de la Nature. He afterwards published Système Social, or Principes Naturels de la Morale et de la Politique: Bons Sens, or Idées Naturelles opposées aux Idées Surnaturelles —a sort of atheist's catechism; Eléments de la Morale Universelle; &c., &c. According to Holbach matter is the only form of existence, and everything is the effect of a blind necessity.

Holbein (hol'bīn), HANS, an eminent German painter, born at Augsburg in 1497. He studied under his father, Hans Holbein the elder, a painter of considerable merit (1450–1526), and at an early age settled at Basel, where he exercised his art till about 1526. He then came to England, where letters from his friend Erasmus, whose Panegyric on



Hans Holbein the younger.

Folly he had illustrated by a series of drawings, procured him the patronage of the chancellor Sir Thomas More. He was appointed court painter by Henry VIII.; and in the Windsor collection has left portraits of all the eminent Englishmen of the time. The most celebrated of his pictures are the Madonna at Darmstadt (better known through the replica at Dresden), representing the Burgomaster Meyer and his wives kneeling to the Virgin; and the Solothurn Madonna. His famous Dance of Death has only been preserved in the engravings of Lützelburger. There are a considerable number of engravings on wood and copper from Holbein's designs. He died at Whitehall of the plague in 1543.

Holberg, LUDWIG, BARON, the father of modern Danish literature, was born at Bergen, in Norway, then part of the Danish dominions, in 1684; died at Copenhagen January 27, 1754. He studied at the University of Copenhagen, and afterwards travelled through a good part of Europe, spending some time in Oxford, where he taught music and modern languages, and studied modern history and philosophy. In 1718 he was appointed to an ordinary professorship in

the University of Copenhagen, where after this date he chiefly resided till his death. In 1735 he was elected rector, and in 1737 treasurer of the university in which he held his professorship, and in 1747 he was raised to the rank of baron. His works may be divided into four classes—poems, stage pieces, philosophical treatises, and historical works. His poems are chiefly of a satirical nature. The most celebrated is Peder Paars, a comic heroic poem in fourteen cantos, which is still regarded throughout the Scandinavian countries as a masterpiece. Almost equally famous is his Nicolas Klimm's Subterraneous Travels, a satirical romance in prose. His stage pieces are all either comedies or farces, and are nearly all characterized by true comic power. Among his philosophical writings the most important is his Moral Reflections (1744). His historical works include The Political, Ecclesiastical, and Geographical Condition of the Danish Monarchy, A General History of the Jews, and A History of Famous Men and Famous Women (1739–45).

Holcus, a genus of grasses (nat. order Gramineæ), extremely common in some pastures, where they are called soft grasses. Whether because of their innutritious quality, or of the soft hairs with which they are covered, they are neglected by cattle. *H. saccharatus* contains a large quantity of sugar, and *H. odorātus* is celebrated for its fragrance. There are only two species native to Britain, woolly soft grass or meadow soft grass (*H. lanātus*) and creeping-rooted soft grass (*H. mollis*), which are both perennial, growing about 2 feet high when in flower, and equally covered with soft dry hairs.

Hold, the whole interior cavity or belly of a ship, or all that part of her inside which is comprehended between the floor and the lower deck throughout her length.

Holibut. See *Halibut.*

Holiday, any day set apart as a religious or national festival; in a general sense a day or a number of days during which a person is released from his everyday labours. In Britain certain days were fixed as bank-holidays by parliament in 1871, and it was enacted that all business transactions which would have been valid on any such holiday shall be held as valid if performed on the day following. In England and Ireland the bank-holidays are Good Friday, Easter Monday, Whit-Monday, the first Monday of August, Christmas Day, and the 26th of December (or the 27th should the 26th be a Sunday). The days fixed as bank-holidays for Scotland are New-Year's Day, Good Friday, the first Monday of May, the first Monday of August, and Christmas Day; and if either New-Year's Day or Christmas Day falls on a Sunday, the Monday after is held as a holiday. These holidays are observed also by Custom Houses, Inland Revenue, and other public offices.

Hol'inshed, Raphael (Ralph), an English chronicler of whom nothing more is known than that he was descended from a family originally belonging to Cheshire, that he lived in the age of Queen Elizabeth, and that he died about 1580. He is only known by his Chronicles of Englande, Scotlande, and Irelande, the first edition of which, known as the 'Shakspere edition,' because it is the one which is supposed to have been used by him in collecting material for his historical plays, was published in London in 1577. In the preparation of this work Holinshed was assisted by several of the most learned men of the day.

Holkar, the family name of the Maharajahs of Indore.

Holl, Frank, R.A., portrait and subject painter, son of Francis Holl, an eminent engraver, was born in London, 1845, died 1888. He was a very successful student at the Royal Academy, and exhibited constantly from his student days. Among his best-known pictures are Faces in the Fire, Fern-Gatherers, No Tidings from the Sea, Leaving Home, and the Gifts of the Fairies. Latterly he devoted himself to portraiture, in which he greatly excelled, and painted many of the celebrities of the day.

Holland, or Parts of Holland, a district of England, one of the three portions into which the county of Lincoln is divided. It occupies the south-east part of the county round the Wash, and consists almost entirely of low, marsh, and fen land.

Holland, a fine and close kind of linen, so called from its first being manufactured in Holland; also a coarser linen fabric, unbleached or dyed brown, used for covering furniture, carpets, &c., or for making window-blinds or the like.

Holland, Henry Richard Vassall Fox, Third Lord, born 1773, died 1840. He succeeded to the peerage by the death of his father when less than one year old. In 1798 he took his place in the House of Lords, and as the nephew of Charles James Fox was at once acknowledged as a Whig leader.

In 1806 he was commissioner for settling disputes with the United States; lord privy seal in 1806-7; and chancellor of the Duchy of Lancaster. He made Holland House the resort of the wit, talent, and beauty of his day. He is the author of a Life of Lope de Vega (1806), Three Comedies from the Spanish (1807), Foreign Reminiscences (1850), and Memoirs of the Whig Party (1852).

Holland, Sir Henry, an English physician, born 1788, died in London 1873. He was educated at the University of Edinburgh, where he took the degree of M.D. in 1811. In 1816 he established himself in London as a physician, and he rapidly acquired a great reputation. In 1840 he was appointed physician in ordinary to the prince consort, in 1852 physician in ordinary to the queen, and in 1853 was created a baronet. He published Travels in the Ionian Isles, Albania, and Greece; Medical Notes and Reflections; Mental Physiology; and Recollections of Past Life, &c.

Holland, Kingdom of. See *Netherlands.*

Holland, New, the name formerly given to the island or continent of Australia.

Holland, North (*Noordholland*), and Holland, South (*Suidholland*), two provinces of the Netherlands. The greater part of the former consists of a peninsula, bounded by the North Sea on the W. and the Zuider-Zee on the E. Area, 1054 sq. miles. It lies very low, some portions of it being at least partially below the level of the sea, and is generally fertile. A broad margin of downs or sand-hills protects it from the sea on the west. Besides rivers (Vecht, Amstel, Zaan, &c.), it is intersected by the Great North Holland Canal. The chief towns are Amsterdam, Alkmaar, Haarlem, Helder, and Zaandam. Pop. 786,116.—South Holland, the most populous province of the Netherlands, is bounded on the north by North Holland, on the west by the German Ocean. The southern part of the province is broken up into several islands. Area, 1155 sq. miles. Like North Holland, it is a flat and depressed tract, and it also is protected from the sea on the west by a margin of downs or sand-hills. The chief river is the Rhine, with its numerous branches. The lakes were formerly numerous, but most of them are now drained. The soil is fertile and well cultivated. The principal towns are Delft, Dort, Gorkum, Gouda, Leyden, Rotterdam, Schiedam, 's Gravenhage (the Hague). Pop. 911,534.

Holland, Philemon, physician, teacher, and 'translator-general of his age,' born at Chelmsford 1551, died 1636. He became master of the free grammar school of Coventry, and also practised as a physician. His translations include Livy, Pliny, Plutarch's Morals, Suetonius, Xenophon, &c., and he published an edition, with additions, of Camden's Britannia.

Hollands. See *Gin.*

Hollar, Wenzel or Wenceslaus, a Bohemian engraver, born in Prague about 1607, died in London, 1677. He accompanied the Earl of Arundel, the British ambassador to the German emperor, to London, who employed him to engrave some of the pictures of his collection. Among his numerous works, which are esteemed for their delicate, firm, and spirited execution, and which number some 2740 plates, are a set of twenty-eight plates, entitled Ornatus Muliebris Anglicanus, representing the dresses of Englishwomen of all ranks and conditions in full-length figures; Holbein's Dance of Death, &c.

Holloway, Thomas, born 1800, died 1883; proprietor of the popular pills, ointment, &c. He founded a Sanatorium or asylum for the insane, and hospitals for incurables and convalescents, at Egham, Surrey, 1873; and also at the same place the *Royal Holloway College*, designed to supply the best and most suitable education for women of the middle classes. The college, which was opened by the queen in 1886, contains a collection of pictures of the value of £100,000. The total cost of the two institutions was about a million sterling.

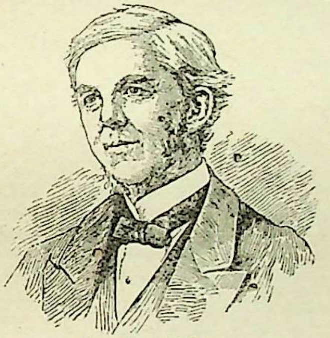
Hollow Ware, the trade term for all kinds of vessels made of cast or wrought iron, and used for cooking and other purposes.

Holly (*Ilex*), a genus of plants of the order Aquifoliaceæ, embracing a number of evergreen trees or shrubs. The common holly (*I. aquifolium*) is common in Britain and the Continent of Europe. It is a handsome, conical evergreen tree, growing to the height of 20 or 30 feet. Its leaves are dark-green, shining, and leathery, abundantly armed with prickles on the lower branches, but free from them on the upper, or on very old trees. The flowers are white, appearing in May; the fruit is red, ripening in September, and remaining on the tree all the winter. A good many varieties are known, distinguished by the shape and colour of the leaves, which are sometimes spotted or edged with yellow, &c. It is excellently adapted

for hedges and fences, as it bears clipping. The wood is hard and white, and is employed for turnery work, knife handles, &c. The bark yields a mucilaginous substance, from which birdlime is made. Among the Romans it was customary to send boughs of holly to friends, with new-year's gifts, as emblematical of good wishes; and it is used to decorate houses at Christmas. The American holly (*Ilex opaca*) is widely diffused throughout the United States. It sometimes attains the height of 80 feet, with a trunk 4 feet in diameter. The *I. glabra* is another species of holly, inhabiting the coast regions of the United States. Its leaves furnished the 'black drink' which used to hold an important place in Indian ceremonies. The *maté* or Paraguay tea-plant is a species of holly (*I. Paraguayensis*).

Hollyhock, a biennial plant (*Althæa rosea*), nat. order Malvaceæ. It is a native of China, and is a frequent ornament of gardens. There are many varieties, with single and double flowers, characterized by the tints of yellow, red, purple, and dark purple approaching to black. It reaches a height of 8 feet or more.

Holmes (hōmz), OLIVER WENDELL, M.D., LL.D., American writer, born at Cambridge,



Oliver Wendell Holmes.

Mass., 1809, and educated at Harvard University. He began the study of law, but in a short time relinquished it for that of medicine. In 1839 he became professor of anatomy and physiology in Dartmouth College, N.H., but resigned after two years' service in order to devote himself to practice in Boston. In 1847 he was appointed to the chair of anatomy at Harvard, a position which he filled till 1882. He was a voluminous writer both in prose and verse, and shone as a prominent figure in the famous group associated with the Atlantic Monthly. His chief works, besides several volumes of poems, and treatises on medicine, are The Autocrat of the Breakfast Table, The Professor at the Breakfast Table, and The Poet at the Breakfast Table; Elsie Venner, The Guardian Angel, A Mortal Antipathy, and Memoirs of Motley and Emerson. A visit to Europe in 1886 produced a charming record, A Hundred Days in Europe. He died in 1894.

Holm-oak, *Quercus Ilex*, a shrub-like tree, native of the Mediterranean countries, with holly-like leaves. In its native countries it attains a considerable size and age, but in Britain it forms an ornamental evergreen bush of from 20 to 30 feet high, seldom becoming single-stemmed.

Holofernes. See *Judith*.

Holograph, any writing, as a letter, deed, will, &c., wholly written by the person from whom it bears to proceed. In Scots law a holograph deed is valid without the signatures of witnesses, but in English law every deed, whether holograph or not, must have the names of two witnesses attached to it to render it valid.

Holoptychius (-tik'i-us), a genus of fossil ganoid fishes occurring in the upper old red sandstone. The head was covered with large plates, and the body with bony scales, rhombic or cycloid in form. The jaws, besides being armed with numerous sharp-pointed fish-teeth, were furnished with large teeth of a conical form.

Holothuria, the type of an order of Echinoderms, the *Holothurioidea* or sea-cucumbers. This order is destitute of the calcareous plates typical of the class, but has a leathery integument open at both ends, and pierced by orifices through which suctorial feet or ambulacra protrude. They have the mouth surrounded by tentacula; a long convoluted alimentary canal; respiratory organs near the anus, and generally in the form of two branching arborescent tubes (forming the 'respiratory tree') into which the water is admitted; and the organs of both sexes in each individual. They are capable of extending themselves to several times the length they have in a state of repose, and of extraordinary reproduction of parts, even of vital organs. The young undergo a metamorphosis during development. They abound in the Asiatic seas, the bêche-de-mer or trepang being a member of the family.

Holstein. See *Schleswig-Holstein.*

Holster, a leathern case for a pistol, carried by a horseman at the fore part of his saddle, and frequently covered with wool or fur.

Holy Alliance, a league concluded at Paris, Sep. 26, 1815, between Alexander I., emperor of Russia, Francis of Austria, and Frederick William III. of Prussia, and signed with their own hands, and without the countersign of a minister. It consisted of a declaration, that, in accordance with the precepts of the gospel of Jesus Christ, the principles of justice, charity, and peace should be the basis of their internal administration, and of their international relations, and that the happiness and religious welfare of their subjects should be their great object. Its real aim, however, was to maintain the power and influence of the existing dynasties. It was offered for signature to all the European Powers except the pope and the sultan of Turkey, and accepted by all except Britain. The events of 1848 broke up the Holy Alliance.

Holy Coat of Treves, a relic preserved in the cathedral of Treves, and said to be the identical seamless coat worn by our Saviour at his crucifixion, and for which the soldiers cast lots. It was the gift of the Empress Helena, by whom it was discovered in her visit to Palestine in the 4th century. It has been exhibited to vast numbers of pilgrims at irregular intervals. The same claim is made for several coats kept in other places.

Holy Family, in art, representations of the infant Saviour and his mother, accompanied by one or more members of his family.

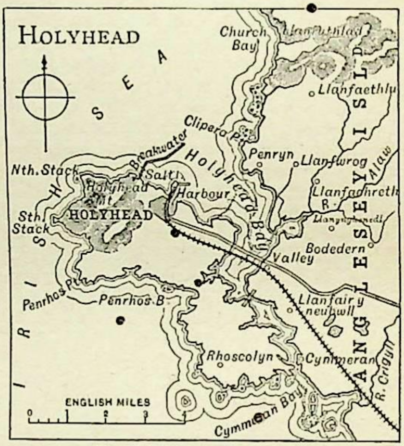
Holy Ghost, according to Trinitarians, the third Person in the Holy Trinity; according to the Socinians, a Biblical metaphor, to designate the divine influence. The doctrine of the Athanasian creed adopted by Roman Catholics, Lutherans, and Calvinists alike, is that the Holy Ghost proceeded from both Son and Father, and is co-eternal and equal with both. The Eastern Church, however, following the Council of Alexandria held in 362, asserts that the Holy Ghost proceeds from the Father alone.

Holy Ghost, ORDER OF, an order of male and female hospitallers, founded by Guy, son of William, Count of Montpellier, towards the end of the 12th century, for the relief of the poor, the infirm and foundlings. After the middle of the 18th century it was united with the order of St. Lazarus by Clement XIII. This was also the name of the principal military order in France instituted in 1578 by Henry III., abolished in 1789, revived at the Restoration, and again abolished in 1830.

Holy Grail. See *Grail.*

Holy Grass, *Hierochlŏe*, an odoriferous genus of grasses belonging to the Phalarideæ, and consisting of several species spread over the cold parts of both hemispheres. The *H. borealis*, or northern holy-grass, is found in Scotland, Iceland, and throughout Northern Europe, Asia, and America, and occurs also in New Zealand. It has its name from the practice adopted in some parts of Germany of strewing it before the doors of churches on festival days.

Holyhead, an island, parl. borough, and seaport town of North Wales, in the county of Anglesey. The island is about 7 miles long and 5 miles broad at the widest part,



is situated off the west side of Anglesey, and is connected with the mainland by a causeway. The town is on the north-east side of the island, and owes its prosperity to the railway and steamboat traffic between England and Dublin. The harbour of refuge (Victoria Harbour), opened in 1873, is formed by a breakwater which is 7860 feet in length, the whole cost, including some minor works, being £1,500,000. Pop. of town, 8745; of island, 10,010.

Holy Island, or LINDISFARNE, an island off the north-east coast of England, 11 miles south-east of Berwick. It is 1¾ miles from the mainland, with which it is connected by

a narrow neck of sand, traversable at low water. It is of an irregular form, about 2¼ miles in length, and about 1½ mile in breadth at the broadest part. The village of Lindisfarne on the s.w. is much resorted to by summer visitors, but the great object of interest is the extensive ruined abbey of Lindisfarne, founded in 635 by Oswald, king of Northumbria, destroyed by the Danes, and restored by the Normans in 1082. The castle, on a rock 90 feet high, also dates from an early period. Pop. 440.

Holy Land. See *Palestine*.

Holy Maid of Kent. See *Barton, Elizabeth*.

Holy Office. See *Inquisition*.

Holyoke, a city of Hampden, co. Mass., on the w. bank of the Connecticut river. It is a prosperous manufacturing place, its rise dating from 1849, when a dam constructed across the river supplied it with extensive water power. It has manufactures of paper, cotton, wool, wire; machine works, &c. Pop. (1890), 35,637.

Holy Orders. See *Orders, Holy*.

Holy Places of Jerusalem, a term meant to apply more particularly to that group of localities of which the Church of the Holy Sepulchre is the centre, some of the other more celebrated objects being the Garden of Gethsemane, the Church of the Ascension, the Tomb of the Virgin, &c., all connected with the life and passion of our Saviour. The guardianship of the holy places has been a cause of much contention between the Greek and Latin churches. They were formerly under the control of the latter, but since 1757 they have been committed to the care of the Greek Church by imperial ordinance of the Porte. Demands made respecting the holy places and the protection of Greek Christians in Turkey, led to the Crimean war of 1854–56.

Holy Roman Empire, a title which the German Empire received in 962 when Otho I. was crowned at Rome by Pope John XII. It came to an end when Francis II. became hereditary emperor of Austria in 1804.

Holyrood, Palace and Abbey of, in Edinburgh, at the eastern extremity of the old town. The abbey church, founded in 1128 by David I., containing the royal vault, with the ashes of numerous members of the Scottish royal race, is now mostly in ruin. The palace is a large quadrangular building of hewn stone, with a court within surrounded by a piazza. It was erected in successive parts from 1501 to 1679, contains the private royal apartments in modernized condition, the rooms associated with the events in the reign of Mary Queen of Scots, and a gallery 150 feet long, in which are portraits of all the Scottish kings, most of them imaginary. The abbey and its precincts possess the privilege of sanctuary for insolvent debtors, but the class of debtors entitled to sanctuary has been so restricted by recent legislation that the institution may be looked on as obsolete.

Holy Sepulchre, Knights of the, an order of knighthood founded by Godfrey of Bouillon, 1099, for the guardianship of the Holy Sepulchre at Jerusalem, and for the protection of pilgrims. It was revived by Pope Alexander VI., 1496, and reorganized in 1847 and 1868.

Holy Spirit Plant, an orchidaceous plant (*Peristeria elata*) of Central America, known also as the *dove-plant*, from the resemblance of the united stamens and pistil of the flower to a dove hovering with expanded wings, somewhat like the conventional dove seen in artistic representations of the Holy Ghost. It has a spike of almost globose, sweet-scented flowers of a creamy white, dotted with lilac on the base of the lip.

Holy Thursday, Ascension-day, in the Anglican Church, a movable feast, always falling on the Thursday but one before Whitsuntide. In the R. Cath. Ch., the Thursday in Holy Week. See *Holy Week*.

Holy Wars. See *Crusades*.

Holy Water, in the Greek and R. Cath. Ch., salted water which has been consecrated by prayers, exorcism, and other ceremonies, to sprinkle the faithful and things used for the church. It is placed at the door of churches, so that worshippers may sprinkle themselves with it as they enter, and it is used in nearly every blessing which the church gives. Sprinkling the people with holy water seems to date from the 9th century, and it is considered efficacious not from any virtue of its own, but from the effect of the church's prayers at the time of using.

Holy Week, or Passion Week, is that which immediately precedes Easter, and is devoted especially to commemorate the passion of our Lord. The days more especially solemnized during it are Spy Wednesday, Maunday Thursday, Good Friday, and Holy Saturday. It is an institution of very early origin, and is known as Great Week, Silent

Week, Penitential Week, &c. Spy Wednesday was a name given in allusion to the betrayal of Christ by Judas Iscariot. Maundy or Holy Thursday specially commemorates the institution of the Eucharist.

Holywell, parliamentary borough, Flintshire, North Wales, on the estuary of the Dee, 17 miles S.W. Liverpool. It takes its name from the well of St. Winifred, one of the most copious springs in Britain, long a famous resort for the supernatural cure of bodily disease and infirmity. The well is covered by a small Gothic building of early date. Near the town are coal and lead mines, quarries, &c. Holywell is one of the Flint group of parliamentary boroughs. Pop. 3018.

Homage, in feudal law, a formal acknowledgment made by a feudal tenant to and in presence of his lord on receiving the investiture of a fief or coming to it by succession, that he was his vassal. The tenant, being ungirt and uncovered, kneeled and held up both his hands between those of the lord, who sat before him, and there professed that 'he did become his man, from that day forth, of life and limb, and earthly honour,' and then received a kiss from his lord.

Homburg, a town of Prussia, province of Hesse-Nassau, 9 miles N.N.W. Frankfort. It is well and regularly built, and is much frequented on account of the mineral springs and bathing establishment, to which gaming-tables were formerly attached. The waters are of two classes, those of three springs being purgative, and used for complaints of the stomach, liver, kidneys, &c.; those of the remaining two containing iron, and being used as a tonic. Pop. 8663.

Home, HENRY, a Scottish lawyer and author, born 1696, died 1782. He studied law at Edinburgh, and was called to the bar in 1724. He soon acquired reputation by a number of publications on the civil and Scottish law. In 1752 he became a judge of session, and assumed the title of Lord Kames. In addition to his legal works he published Essays on British Antiquities; Essays on the Principles of Morality and Natural Religion, in which he advocates the doctrine of philosophical necessity; Introduction to the Art of Thinking; and his best-known work, Elements of Criticism, in which, discarding all arbitrary rules of literary composition, he endeavours to establish a new theory on the principles of human nature. In 1776 he published the Gentleman Farmer; and in 1781 Loose Thoughts on Education.

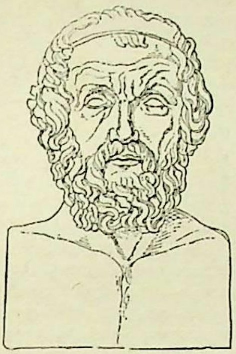
Home, JOHN, Scottish clergyman and dramatic poet, born at Leith, 1722, died at Edinburgh, 1808. He studied for the church, and was appointed to the parish of Athelstaneford, vacant by the death of Blair, author of the Grave. His tragedy of Douglas was performed at Edinburgh in 1756, and attained a wonderful popularity, which has not yet altogether disappeared. The production gave great offence to the church as a body; the author was threatened with ecclesiastical censures, and in consequence resigned his living, and ever after acted and appeared as a layman. He retired into England, obtained the protection of the Earl of Bute, and received a considerable pension. His other plays, the Siege of Aquileia, the Fatal Discovery, Alonzo, and Alfred, are absolutely forgotten, a fate which their mediocrity deserves. His History of the Rebellion of 1745–46 (4to) also disappointed public expectation.

Home Department, that department of the executive government of Britain in which the interior affairs of the country are regulated. It is analogous to the ministry of the interior of other countries; its headquarters is the home-office, and its chief is the home-secretary. This official is one of the five secretaries of state of the British government. He is responsible for the internal administration of justice, the maintenance of peace in the country, the supervision of prisons, police, sanitary affairs, &c. The secretary for the home department is assisted by a parliamentary under-secretary and a permanent under-secretary.

Home Office. See *Home Department.*

Homer (Greek, *Homēros*), an ancient Greek epic poet of whom nothing is known with certainty, some even doubting whether he ever existed. The most probable opinion is that he was a native of some locality on the sea-board of Asia Minor, and that he flourished between 950 and 850 B.C. The earliest mention of the name of Homer is found in Xenophanes (6th century B.C.). The common statement that he was blind may safely be discarded. The poems that have been generally attributed to Homer are the Iliad and Odyssey. The Batrachomyomachia, or Battle of the Frogs and Mice, and certain hymns to the gods also passed under his name, though belonging to a later period. The Iliad in its present form consists of twenty-four books, and tells the story of the siege of Troy from the quarrel of Achilles with Agamemnon to the

burial of Hector, with subordinate episodes. The Odyssey is also in twenty-four books, and records the adventures of Odysseus (Ulysses) on his return voyage to his home in Ithaca after the fall of Troy. Even as early as the beginning of the Christian era, certain Greek critics (the Separatists) maintained that the two poems were the work of different poets, but the general belief continued to be that there was one author for both. The entire system of Homeric criticism, however, was revolutionized in 1795 by F. A. Wolf in his Prolegomena to Homer. He asserted that the Iliad and Odyssey were not originally committed to writing, and were not two complete and independent poems, but originally a series of songs of different poets (Homer and others), celebrating single exploits of heroes, and first connected as wholes by Pisistratus, about 540 B.C. Some of Wolf's arguments have been proved erroneous, but since his time the old views in regard to the Iliad and Odyssey have been held by comparatively few of the ablest scholars, though what theory is now the most common is difficult to say. Among the most conservative theories is that which assigns to Homer a central or basal portion of both Iliad and Odyssey, to which additions by other poets were gradually united; but generally the Odyssey is regarded as of somewhat later date than the Iliad, and not by the poet who produced the Iliad in its original form.


Homer—ancient bust.

Home Rule, in British politics, a measure which has been more especially advocated in regard to Ireland. The leading feature of the Irish Home Rule party seems to be the establishment of a native parliament in Ireland to conduct all local and internal legislation, leaving the general political government of the empire to an imperial parliament. The movement originated in the formation of the Home Government Association at Dublin, in 1870, under the presidency of Mr. Isaac Butt. At the general election of 1874 the party succeeded in sending 60 Home Rule members to parliament for Irish constituencies. The elections of 1885 and 1886 still further strengthened the party, 86 members following the lead of Mr. Parnell (which see). The original scheme has been materially modified since Butt's time, and there are not wanting Irishmen who declare openly for absolute independence, which many believe to be the ultimate aim of the whole party. The conversion of Mr. Gladstone and many members of the Liberal party to Home Rule principles has added immense strength to the movement. Similar schemes for Scotland and Wales have been agitated. See also *Land League*.

Home-sickness, in medicine, *Nostalgia*, a disease arising from an intense and uncontrolled feeling of grief at a separation from one's home or native land. It is most frequent among persons who leave mountainous and go to flat countries, as the Scotch Highlanders and Swiss, or among those who change from the country to the town. It commences by a deep melancholy, is sometimes accompanied by low, nervous, hectic fever, or occasionally changes into phthisis, and may terminate fatally.

Homici'dal Mania, a species of mania in which a sudden irresistible impulse to destroy life seizes the patient. It is independent of hatred towards the victim, or of any appreciable motive, and its causes are obscure.

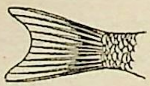
Homicide, the killing of one man or human being by another. In law, homicide is of three kinds—*justifiable*, *excusable*, and *felonious; justifiable*, when it proceeds from unavoidable necessity, as where the proper officer inflicts capital punishment, where an officer of justice kills an offender who assaults or resists him and who cannot otherwise be captured, or where persons are killed in the dispersion of rebellious or riotous assemblies; *excusable*, when it happens from misadventure, as where a man in doing a lawful act by accident kills another, or in self-defence, as where a man kills another in defence of the life of himself, his wife, children, parent, servant, &c.; *felonious*, when it proceeds from malice, or is done in the prosecution of some unlawful act, or in a sudden passion. Self-murder also is felonious homicide. Felonious homicide comprehends murder and manslaughter. In Scots law manslaughter gets the name of *culpable homicide*.

Hom'ildon, BATTLE OF, a battle fought in 1402 between the Scots under Archibald, earl of Douglas, and an English force under Hotspur and the earl of March, at Homildon Hill, near Wooler. The Scots were utterly defeated.

Homilet'ics, the art of preaching; that branch of practical theology which teaches the principles of adapting the discourses of the pulpit to the spiritual benefit of the hearers, and the best methods which ministers of the gospel should pursue for instructing their hearers by their doctrines and example.

Homily, a discourse or sermon read or pronounced to an audience on some subject of religion; a discourse pronounced in the church by the minister to the congregation. The ancient homily was sometimes simply a conversation, the prelate talking to the people and interrogating them, and they in turn talking to and interrogating him. In modern use a homily differs but little from an ordinary sermon, the idea of simplicity, however, being always attached to it. The earliest existing examples of the homily are those of Origen in the 3d century. In the schools of Alexandria and Antioch this form of discourse was sedulously cultivated, and Clement of Alexandria, St. Dionysius, and Gregory Thaumaturgus are among the names most eminent in this department. It was in later centuries, however, and in the hands of Athanasius, Gregory of Nyssa, and Gregory of Nazianzus, Basil, Cyril of Jerusalem, and Cyril of Alexandria, and especially of Chrysostom that the homily reached its highest excellence. Augustine and Gregory the Great were among the western composers of homilies. In the Church of England, after the Reformation, two official books of homilies were issued. These were called The First and Second Books of Homilies, and the former, ascribed to Cranmer, appeared in 1547; the latter, said to be by Jewell, in 1563. They were originally meant to be read by those of the inferior clergy who were not qualified to compose discourses themselves.

Homing Pigeon. See *Carrier Pigeon*.



Homocercal Tail.

Homocer'cal (Gr. *homos*, same, *kerkos*, tail), a term applied in the case of fishes which have tails with rays diverging symmetrically from the backbone, as opposed to *heterocercal*.

Homœop'athy, the name of a system of medicine introduced by Samuel Hahnemann of Leipzic (died 1843). It is a system founded upon the belief that drugs have the power of curing morbid conditions similar to those they have the power to excite, an old belief long ago expressed in the Latin phrase 'similia similibus curantur' (like is cured by like). In contradistinction to this system the more common method of treating diseases has been termed *heteropathy* or *allopathy*. In practice homœopathy is associated with the system of administering infinitesimal doses.

Homoiousians, a sect of Arians, followers of Eusebius, who maintained that the nature of Christ is not the same with, but only similar to (Gr. *homoios*, like), that of the Father, as distinguished from the Homoousians, who maintained that he was of the same nature. See *Homoousians*.

Homol'ogous, (1) in geometry, corresponding in relative position and proportion. (2) In physiology, corresponding in type of structure; thus, the human arm, the foreleg of a horse, the wing of a bird, and the swimming-paddle of a dolphin or whale, being all composed essentially of the same structural elements, are said to be homologous, though they are adapted for quite different functions. See *Analogue*.

Homoousians (Gr. *homos*, same, *ousia*, being, nature), the orthodox party in the church during the great controversy upon the nature of Christ in the 4th century, who maintained that the nature of the Father and the Son is the same, in opposition to the *Homoiousians*, who held that their natures were only similar. See *Homoiousians*.

Homop'tera, one of the sections into which



Homoptera—*Cicada Diardi.*

the order of hemipterous insects has been divided, the other section being the Heteroptera. The insects of this section have the wing-covers generally deflexed, of the same consistence throughout, the antennæ mostly short and terminated by a bristle, and the body convex and thick. To this section belong the aphides, cicadas, lantern-flies, &c.

Homs. See *Hems*.

Honan′, a once populous city of China, in the province of same name, on an affluent of the Hoang-ho. The province has an area of 65,104 square miles. It is generally level, and is watered by the Hoang-ho and its affluents. The soil is fertile and carefully cultivated; the forests in the west supply timber; and mines yield tutenag or Chinese copper, cinnabar, mica, &c. Honan suffered severely from the inundation of the Hoang-ho in 1887; capital, Kai-fung. Pop. 22,117,036.

Honawar′, seaport and chief town of subdivision of the same name, Bombay, on an estuary into which the Gersoppa river falls. It has an important and growing coasting trade. Pop. 6658.

Hondo, the name given by the Japanese to the chief island in their empire. In many geographical works Nippon or Niphon is the distinctive appellation of this island, but by the Japanese themselves that name is applied to the whole country. The area of the island is 87,425 sq. miles, and the pop. (1894), 31,722,674. See *Japan*.

Hondu′ras, a republican state of Central America; area, 39,600 square miles. Its surface is hilly with numerous fertile valleys. Its mineral wealth is very considerable, and includes gold, silver, lead, and copper. The chief rivers are the Chamelicon, Ulua, and Aguan, flowing to the Caribbean Sea, and the Choluteca, an affluent of the Pacific. There are extensive forests abounding in fine timber. The principal cultivated productions are maize, beans, some wheat, rice, plantains, and tobacco. Since 1880 the capital has been Tegucigalpa, the principal ports are Truxillo on the Caribbean Sea, and Port San Lorenzo, in the Pacific. The constitution of the state gives the legislative power to a congress of deputies composed of thirty-seven members. The executive authority is in the hands of the president. The resources of the country are undeveloped, and the finances are in a very disordered state. Pop. 458,000.

Honduras, Bay of, a wide inlet of the Caribbean Sea, having on the south Guatemala and Honduras, and on the west British Honduras and Yucatan. Along its shores are the islands of Bonaca, Ruatan, Utila, Turneff, and numerous islets and reefs called cays.

Honduras, British, or Belize, a British colony of Central America, having north and west, Yucatan; west and south, Guatemala; and east, the Bay of Honduras. Area, 7562 sq. miles. The coast is generally low and swampy, but the land rises towards the interior, and in some parts may be called mountainous. The mountains, and the wide valleys between them, are covered with extensive forests of the finest timber, including cedars, pines, iron-wood, logwood, braziletto, mahogany, &c. Sugar-cane, coffee, bananas, cocoa-nut, tobacco, &c., are cultivated; and the exports include mahogany, logwood, bananas, and other fruits. The climate is fairly healthy. Since 1884 the government has been administered as in a crown colony under the presidency of a governor. The capital is Belize or Balize. Honduras was transferred by Spain to England by treaty in 1670, but at different times its occupation was contested by the Spaniards till 1783, since which period it has remained quietly in the possession of Great Britain. The population is composed chiefly of negroes and Caribs from the West Indies, who were first brought to the country as slaves. Pop. 32,899, including about 400 whites.

Hone, the name given to several varieties of slaty stones employed in whetting knives, razors, or other edge-tools. They are usually pieces of hard close-grained clay-slate, containing minute particles of quartz, with a uniform consistence. The best-known varieties are the Ayr stone, so called from being found in the river Ayr, in Scotland; the Charnley Forest stone, found in Charnwood Forest, Leicestershire; the German hone, the Canada oil-stone, Turkey oil-stone, &c.

Hone, William, English antiquary, born 1780, died 1842. He began life in a law-office and became imbued with freethinking opinions. In 1800 he abandoned the law and made ventures as a writer, bookseller, and publisher, which were all failures. In 1817 he was prosecuted by government for the publication of alleged irreverent parodies and lampoons, when he defended himself with great acuteness, and was acquitted. He subsequently had a large sum subscribed for him as a champion of the freedom of the press. He gradually abandoned freethought and the writing of satires for religion and antiquarianism. His chief publications are the Every-day Book (1826), Table-book (1827–28), and Year Book (1829), perfect mines of antiquarian lore.

Honey, a vegetable product, with saccharine properties, collected by bees from the blossoms of flowers, and deposited in the cells of their combs. The best is clear and

transparent, and solidifies when kept for some time into a granular, white mass. Some varieties of it are dark yellow or brownish in colour. Spring honey is more esteemed than summer honey; and the latter more than that of autumn. *Virgin* honey is taken from hives in which the bees have never swarmed, and it is of a white colour. *Yellow* honey is extracted from all sorts of combs. The flavour of honey largely depends on the plants from which it is collected. Honey is obtained in large quantities in many countries, partly from wild bees, but chiefly from those kept in hives. In addition to its ordinary domestic uses, it is employed medicinally as a promoter of expectoration, to sweeten certain medicines, to make a gargle with vinegar, &c. It is also used in making mead. The ancients used it as we do sugar, and made of it and wine a mixture very much liked. See *Honey-comb.*

Honey-ant, an ant (*Myrmecocyctus mexicanus*) inhabiting Mexico, and living in communities in subterranean galleries. In summer a certain number of these insects secrete a kind of honey in their abdomens which become so distended as to appear like small pellucid grapes. Later in the season when food is scarce these ants are devoured by the others, and they are also dug up and eaten by the inhabitants of the country.

Honey-badger. See *Ratel.*

Honey Bear, a name of the kinkajou.

Honey-buzzard. See *Buzzard.*

Honey-comb, a waxen cellular structure framed by the bees to deposit their honey and eggs in. The wax is secreted by the insect in the form of small and thin oval scales in the folds of the abdomen. The comb is composed of a number of cells, most of them exactly hexagonal, and arranged in two layers placed end to end, the openings of the layers being in opposite directions. The comb is placed vertically, the cells being therefore horizontal. The sides of the cells are very thin, and yet the whole structure is of considerable strength. Some cells are destined for the exclusive reception of honey; others for the reception of larvæ.

Honey-dew, a sweet saccharine substance found on the leaves of trees and other plants in small drops like dew. There are two kinds; one secreted from the plants, and the other deposited by aphides. Different kinds of manna are the dried honey-dew or saccharine exudations of certain plants. See *Manna.*

Honey-eater, the name given to a number of insessorial birds forming the family Meliphagidæ, of the tribe Tenuirostres. They form a numerous group, feeding principally



Wattled Honey-eater (*Anthochæra mellivòra*).

on honey and the nectar of flowers. They are natives of Australia and the adjacent islands. They have long curved sharp bills, with tongues terminating in a pencil of delicate filaments, to enable them the better to extract the juices of flowers.

Honey-guide, a name given to the cuckoos of the genus *Indicator*, which by their motions and cries, conduct persons to the nests of wild honey-bees. They are natives of South Africa.

Honey-locust, SWEET LOCUST, or BLACK LOCUST (*Gleditschia triacanthos*), a forest tree belonging to the United States, natural order Leguminosæ. The leaves are pinnated, divided into numerous small leaflets, and the foliage has a light and elegant appearance; the flowers are greenish, and are succeeded by long, often twisted pods, containing large brown seeds, enveloped in a sweet pulp. This tree is especially remarkable for its formidable thorns, on which account it has been recommended for hedges. The *G. monosperma*, a tree resembling the last in general appearance, grows in swamps in Illinois and south-westward. The wood is inferior in quality.

Honey-stone. See *Mellite.*

Honey-suckers. Same as *Honey-eaters.*

Honeysuckle, or WOODBINE, genus *Lonicĕra* of Linnæus, natural order Caprifoliaceæ. The common honeysuckle of Britain, *L. periclymĕnum*, a twining shrub, with distinct leaves and red berries, is indigenous in Great Britain; but two others have been naturalized, *L. caprifolium*, distinguished by its

upper leaves being united in a cup; and *L. xylosteum*, with small, yellowish, scentless flowers, and scarlet berries. *L. sempervirens* (trumpet-honeysuckle) is also cultivated in Britain on account of the beauty of its flowers. The honeysuckle family is represented in North America by nine different species. *Australian honeysuckle* is a name given to *Banksia australis* and other species of the Protea family, from their flowers being filled with a sweet liquid.

Honfleur (on-fleur), a seaport of France, department of Calvados, on the estuary of the Seine. It was a poorly-built place, but has lately been much improved. The rise of Havre has injured its commerce, but it still has a trade in agricultural and dairy produce, some manufactures in connection with shipping, fisheries, &c. On the hill above the town is the chapel of Notre Dame de Grace much frequented by sailors, and filled with their votive offerings. Honfleur was long in possession of the English, and makes a considerable figure in the history of their French wars. Pop. 9726.

Hong-Kong, an island off the S.E. coast of China, belonging to the British, at the mouth of the estuary that leads to Canton, from which it is distant 75 miles. It is about 10 miles in extreme length, and 7½ miles in extreme breadth, separated from the mainland by a narrow strait, and with Cowloon on the mainland forms a crown colony, area 32 sq. miles. The island consists almost entirely of barren rocks, which rise to heights of 1000 to 2000 feet, and is almost destitute of vegetation. Good water, however, is abundant. On the north side of the island, on a splendid harbour, is Victoria, the chief town of the island and centre of its commerce. It is well laid out with handsome streets, and has a cathedral, a bishop's palace, a government-house, court-house, &c.; while handsome residences of the merchants are scattered about the town and its suburbs. Hong-Kong is a great entrepôt for the foreign commerce of China, and is a free port without customs' dues. It is also a station of the British fleet. The revenue of the government is derived from the land rents, licenses to sell opium, spirits, &c., taxes, postages, fines, fees of office, &c. The prosperity of the colony is chiefly owing to the presence of large numbers of Chinese, engaged in trade or in working the building-stone, which is one of the principal products of the island. The foreign commerce is mainly carried on with Great Britain. Considerable quantities of goods are imported direct from the United Kingdom, cotton goods being by far the largest item; the exports to Britain consist chiefly of silks, tea, and hemp. The currency consists chiefly in silver dollars, of the nominal value of about 4*s.* 2*d.* each. Hong-Kong was ceded to Britain in 1842; some 200 sq. miles additional were leased in 1898. Pop. about 246,000; more than nine-tenths being Chinese, and 11,000 whites.

Hon'iton, a town of England, in Devonshire, on the Otter, long celebrated for the manufacture of a special variety of lace. It was a parliamentary borough till 1868, and now gives name to a parl. div. of the county. Pop. 3216.

Honolu'lu, the capital of the Sandwich Islands, south side of the island of Oahu. Its most notable edifices are the royal palace, the Roman Catholic cathedral, the treasury, the parliament house, &c. There is a fine natural harbour. Honolulu is a rapidly improving place. Pop. 22,907.

Honorius, FLAVIUS, son of Theodosius the Great, born 384 A.D., died 423. After the division of the empire, A.D. 395, Honorius received the western half, but, on account of his youth, Stilicho was appointed his guardian. The principal events of his reign are the adoption of rigorous measures against paganism in 399; the invasion by Alaric in 400–403; another irruption of barbarians under Rhadagaisus, 405–406. Both invasions were repelled by Stilicho, who was assassinated at Ravenna in 408. Alaric marched on Rome and plundered it in 409, while Honorius shut himself up in Ravenna. Some of the finest provinces of the empire, Spain, Gaul, and Pannonia, were lost in this reign.

Honour, in law, is a seignory consisting of several manors held under one baron or lord-paramount.

Honour, MAIDS OF, ladies in the service of European queens, who attend their mistress when she appears in public. In England they are eight in number.

Honourable, RIGHT HONOURABLE and MOST HONOURABLE, titles given in the United Kingdom to peers, their families, and certain public functionaries. (See *Address, Forms of*.) In America the governors of states, judges, members of Congress, and others holding offices of dignity and trust, are styled honourable.

Honours, MILITARY, compliments or salutes paid by troops to royalty, officers of

rank, &c., or given at funerals to all grades of the army.—*Honours of War* are stipulated terms granted to a garrison surrendering, in consideration of a brave defence, &c. Sometimes the vanquished are allowed to march out with their arms, drums beating, and colours flying; or they may be permitted to deposit their arms and stores at a certain spot, and return to their own country on parole.

Honvéd, the name applied to the Hungarian militia.

Hoobly, or HUBLI, a town of India in Dhárwár district, Bombay Presidency, a great centre of the cotton trade. Pop. 52,595.

Hooch, or HOOGH (hō*h*), PIETER DE, one of the best Dutch painters in genre, born 1630, died about 1681. He was peculiarly successful in depicting scenes, illuminated by sunlight, of Dutch domestic life. Many of his finest works are in British galleries.

Hood, ROBIN, a celebrated outlaw who, according to the popular account, with his followers, inhabited Sherwood Forest, in Nottinghamshire, and also the woodlands of Barnsdale in the adjoining West Riding. They supported themselves by levying toll on the wealthy, and more especially on ecclesiastics, and by hunting the deer of the forest. The principal members of his band were his lieutenant Little John, his chaplain Friar Tuck, William Scadlock, George-a-Greene, Much, the miller's son, and Maid Marian. It is stated that he was born in 1160. His death is said to have occurred in 1247, in consequence of the treachery of the prioress of Kirklees, who opened an artery by which he bled to death. His skill with the long-bow and quarter-staff was celebrated in tradition. What basis of fact there is for the story of Robin Hood is doubtful. Grimm maintained that he was one with the Teutonic god Woden. Other theories suppose him to have been a rebel yeoman in Lancaster's rebellion under Edward II.; a Saxon chief who defied the Normans; and a fugitive follower of Sir Simon de Montfort after the battle of Evesham.

Hood, SAMUEL, VISCOUNT, a British admiral, born 1724, died 1816. He joined the navy as a midshipman in 1740, and attained the rank of post-captain in 1759. Having become rear-admiral, he preserved the island of St. Christopher's from being taken by De Grasse, assisted in the defeat of De Grasse by Rodney in 1782, and was rewarded with the title of Baron Hood of Catherington in the Irish peerage. In 1793 he commanded against the French in the Mediterranean, and captured Toulon and Corsica. In 1796 he was made an English peer, with



Viscount Hood.

the title of Viscount Hood.—ALEXANDER, VISCOUNT BRIDPORT, brother of the preceding, was also an admiral. He commanded under Lord Howe in the Channel fleet in 1794; defeated the French off L'Orient, 1795; created Viscount Bridport, 1801; died 1814.—SIR SAMUEL, cousin of the above, born 1762, died 1815, was present at the battle of the Nile, 1798; captured Tobago and the Dutch settlements in Guiana, 1803; and defeated the French squadron off Rochefort in 1806.

Hood, THOMAS, an English poet and humorist, of Scotch extraction, born at London, 1799, died 1845. During a residence at Dundee, and while only fifteen or sixteen years of age, he contributed articles to a local paper and magazine. In 1821 he became sub-editor of the London Magazine, and in 1826 appeared his Whims and Oddities, which was followed by National Tales and a volume of serious poetry. From 1829 to 1837 he conducted his Comic Annual. At the same time his pen was employed on other subjects, and he published The Epping Hunt, a comic poem, ridiculing Cockney sportsmen; Eugene Aram's Dream, inserted in the Gem, of which he was for a short time editor; and Tylney Hall, a novel. In 1837, on the termination of the Comic Annual, he commenced a monthly periodical entitled Hood's Own, which consisted chiefly of selections from the former work. His health now began to fail, and with a

view to its recovery he paid a visit to the Continent. While there in 1839 he published his Up the Rhine, which, based on the lines of Humphrey Clinker, was very popular. Shortly after his return he undertook the editorship of the New Monthly Magazine, and continued it till 1843. His principal contributions to it he published separately, under the title of Whimsicalities. His last periodical, entitled Hood's Magazine, was commenced in 1844; but his health shortly afterwards completely broke down, and his death occurred in the following year. It was during his last illness that he contributed to Punch The Song of a Shirt, The Bridge of Sighs, and The Lay of a Labourer. Hood is unrivalled as a punster, and he possesses a singular power of combining the humorous with the pathetic. He had the satisfaction of knowing that the pension of £100 conferred upon him on his last illness by Sir Robert Peel was to be transferred to his wife.

Hood, Tom, son of the great humorist, and a miscellaneous writer, born 1835, died 1874. He studied at Oxford, and during his residence there he wrote Pen and Pencil Pictures. In 1861 appeared his Daughters of King Daker, and other Poems. In 1865 he became editor of Fun, which became very popular under his management. His talents, although similar to those of his father, were less brilliant.

Hooded Crow. See *Crow.*

Hooded Seal (*Cystophŏra cristāta*), a species of seal, the male of which possesses a movable, inflatable muscular bag, stretching from the muzzle to about five inches behind the eyes. The prevailing colour is bluish black—the head and limbs being uniformly black. Its usual range extends in America southwards to Newfoundland, and in Europe to Southern Norway.

Hooded Snake. See *Cobra de Capello.*

Hoofs, the horny tissues which constitute the external part of the feet of certain animals, mostly herbivorous. They may be regarded as homologues of the toe-nails of other animals. They are composed of epithelium cells, agglutinated and dried, and of intercellular substance and cell contents. Chemically they consist of keratin.

Hooghly River. See *Hugli.*

Hook, Theodore Edward, novelist and journalist, born 1788, died 1841, was the son of James Hook, a musical composer. After leaving Harrow he employed himself in composing the farce of The Soldier's Return, instead of reading for Oxford. For some years Hook led a life of gaiety in London, and became notorious for practical jokes and similar escapades. In 1812 he was appointed accountant-general and treasurer of the Island of Mauritius; but, owing to his gross carelessness, a large deficiency in the military chest was discovered, and in 1818 he was sent home under arrest, but no proceedings were taken against him. From 1820 to 1841 he was editor of the John Bull, and at intervals from 1824 to 1828 he published his Sayings and Doings, while in 1836 he became editor of the New Monthly Magazine. His other principal works are Life of Sir David Baird, and a series of novels, among which may be mentioned Love and Pride, Jack Brag, Gilbert Gurney, Gurney Married, Precepts and Practice, Fathers and Sons.

Hook, Walter Farquhar, Dean of Chichester, nephew of the above, was born in 1798, died in 1875. In 1821 he graduated at Christ Church, Oxford, was appointed vicar of Leeds in 1837, and promoted to the deanery of Chichester in 1859. He wrote a Dictionary of Ecclesiastical Biography, a Church Dictionary, Lives of the Archbishops of Canterbury, &c.

Hookah. See *Pipe* (*Tobacco*).

Hooke, Nathaniel, an English historian, born about 1690, died 1763. He was a friend of Pope and other literary men. His best-known work is his Roman History, from the Earliest Period to the Accession of Augustus.

Hooke, Robert, an English mathematician and natural philosopher, born 1635, died 1703. In 1658–59 he invented the balance spring of watches, an honour otherwise ascribed to Huyghens; in 1664 he became Cutlerian professor of mechanics to the Royal Society, and in 1664 professor of geometry at Gresham College. He partially anticipated the Newtonian theory of gravitation and the undulatory theory of light, and invented or materially improved many scientific and mechanical instruments.

Hooker, Sir Joseph Dalton, M.D., a British botanist, born in 1817, son of Sir W. J. Hooker (see next page). In 1839 he graduated M.D. of Glasgow University, and immediately joined the antarctic expedition of the *Erebus* and *Terror* under Sir J. C. Ross, publishing on his return the Botany of the Antarctic Voyage. In 1847–51 he travelled in the Himalayas, and his Himalayan Journals embody the results of

the journey. In this connection he also published The Rhododendrons of the Sikkim Himalaya. Other works of his are: The Student's Flora of the British Islands; The Flora of British India; Journal of a Tour in Morocco. He and George Bentham (which see) wrote the great work Genera Plantarum, published 1862–1883. In 1865 he became director of Kew Gardens, but resigned in 1885; he was made Companion of the Bath in 1869; president of the Royal Society in 1873; Knight Commander of the Star of India in 1877.

Hooker, RICHARD, a celebrated English divine, born 1553, died 1600. He went up to Oxford in 1563, and became a Fellow of Christ Church in 1577. In 1579 he was appointed deputy professor of Hebrew; took orders in 1581, and was made preacher at Paul's Cross. About this period he was induced to marry the daughter of Mrs. Churchman, who had charge of the dwelling set apart for the preachers—a marriage which proved the reverse of happy. In 1584 he became rector of Drayton Beauchamp, and in 1585 Master of the Temple. In 1595 he received the living of Bishopsbourne, in Kent, where he ended his days. His Ecclesiastical Polity, published at various dates, and written in defence of the Church of England, is no less remarkable for learning and extent of research than for the richness and purity of its style, which entitles its author to be regarded as one of the classics of the Elizabethan age.

Hooker, SIR WILLIAM JACKSON, F.R.S., a celebrated botanist, father of Sir Joseph Hooker, born 1785, died 1865. From 1821 to 1841 he was professor of botany at Glasgow University; was knighted in 1836; and became director of Kew Gardens in 1841. He wrote a Monograph of the British Jungermanniæ, Icones Plantarum, A Century of Orchidaceous Plants, &c.

Hoole, JOHN, dramatist and translator, born 1727, died 1803. In 1763 he published a translation of Tasso's Jerusalem Delivered, and of six dramas of Metastasio in 1767. His tragedies of Cyrus, Timanthes, and Cleone were unsuccessful. In 1773–83 he published separate volumes of his translation of Orlando Furioso. In 1792 he translated Tasso's Rinaldo, and ended his literary labours with a more complete collection of dramas from Metastasio.

Hoop-ash (*Celtis crassifolia*), an American tree of the order Urticaceæ, found in the forests of Ohio and in the Western States. It is a fine tree, attains a height of 80 feet, and is employed for charcoal. Its fruit is round, and in size nearly equal to a pea. See *Hackberry* and *Nettle-tree*.

Hooper, JOHN, an English reformer, born 1495, burnt 1555. Having studied at Oxford, he joined the Cistercian order; but by the year 1539 he had adopted the Reformed opinions, and withdrew to the Continent on the imposition of new articles of faith by Henry VIII., and lived at Zurich. In 1547 he returned to England, and took an active share in the Edwardine Reformation. In 1550 he was nominated Bishop of Gloucester, but declined consecration until certain vestments and ceremonies were dispensed with in his case. On the accession of Queen Mary in 1553, Hooper was deprived and imprisoned, and in 1555 burnt at Gloucester, near his own cathedral. His works consist chiefly of a Godly Confession and Protestation of the Christian Faith, Lectures on the Creed, Sermons on the Book of Jonah, Annotations on the Thirteenth Chapter of the Romans, and expositions of several psalms.

Hooping-cough, or WHOOPING-COUGH, a disease known by a rapid series of coughs ending in a long-drawn breath, during which a shrill whistling sound, the *hoop*, is produced. Two or three such fits of coughing follow one another, until some phlegm is expelled, and vomiting may occur. During a severe spasm the face becomes swollen and purplish, as if suffocation were threatened. It is evidently due to a poison acting as an irritant on the pneumogastric nerve. It is contagious, and most commonly attacks children, and generally only once in their lives. The hooping-cough usually comes on with a difficulty of breathing, and other slight febrile symptoms, which are succeeded by a hoarseness, cough, and difficulty of expectoration. After a fortnight or more the cough becomes convulsive, and is attended by the *hoop*. After four or five weeks the expectoration becomes loose, and the fits of coughing gradually diminish in frequency and duration. Hooping-cough is seldom fatal to adults, but is the most fatal disease in the first year of childhood. Bronchitis and pneumonia are the most serious complications.

Hoopoe (*Upŭpa*), a bird forming the type of a family generally classed with the bee-eaters or the honey-eaters, but also with the hornbills. The European hoopoe (*U. epops*) is about 12 inches long; it has a fine crest

of pale cinnamon-red feathers, tipped with black; upper surface on the whole ashy-brown; wings black, the coverts having white bars; throat and breast pale fawn; abdomen white, with black streaks and



Hoopoe (*Upŭpa epops*).

dashes. It has a very wide range, from Burmah to the British Islands and Africa. It is a ground-feeder, preying chiefly on insects, and seems to delight in filth; it nests in cavities of trees or walls, and its eggs vary from four to seven. The hoopoe utters a loud double or treble *hoop*, whence its name.

Hoorn (hōrn), a seaport of Holland, on a small bay of the Zuider-see, 20 miles N.N.E. of Amsterdam. The trade is extensive, more especially in cheese, and there is some ship-building and other industries. Pop. 10,200.

Hoosac Tunnel, the longest railway tunnel in America, in the western part of Massachusetts, on the railway from Boston to Troy, N.Y. It pierces the Hoosac Mountain, the summit range extending southward through Massachusetts from the Green Mountains of Vermont. It is 4¾ miles long, and has a double line of rails.

Hop (*Humŭlus Lupŭlus*), a plant of the nat. order Cannabinaceæ (hemp family), a native of Europe, and perhaps of the United States, where it occurs wild. The root is perennial, giving out several herbaceous, rough, twining stems, with large lobed leaves; the fertile flowers are green; the fruit is a catkin, and the plant is cultivated for the sake of the catkins, which are employed to communicate to beer its aromatic bitter. The young shoots are sometimes boiled and eaten like asparagus; the fibres of the old stems make good cords. The cultivation of the hop is more carefully attended to in England than in any other country, Kent being the chief county in which it is grown; but the plant is also extensively reared in other parts of Europe, as also in N. America, Australia, N. Zealand, &c. The use of the hop catkins depends upon a peculiar bitter substance which they contain, called *lupulin*, which is a yellow powder, containing a bitter principle and a volatile oil. The lupulin constitutes from 10 to 12 per cent by weight of the catkin, and the bitter principle forms from 8 to 12 per cent of the lupulin. Having tonic, stomachic, and narcotic properties hops are often used medicinally. Pillows stuffed with hops are used to induce sleep.



Hop (*Humŭlus Lupŭlus*).

Hop-clover (*Trifolium procumbens*), a plant of the order Leguminosæ, distinguished from other species of clover by its bunch of yellow flowers, which wither to the bright brown of a strobile of hops.

Hope, Thomas, an English writer and art patron, born 1770, died 1831. He inherited great wealth, and devoted much of his time while young to extensive travels in various parts of Europe, Asia, and Africa. His principal works are: Household Furniture and Internal Decorations; The Costume of the Ancients; Anastasius, or Memoirs of a Modern Greek, a novel displaying remarkable descriptive powers and a minute accuracy in the accounts of eastern life; and An Historical Essay on Architecture.

Hop-flea (*Haltĭca concinna*), a coleopterous insect of the same genus with the turnip-fly, and which devastates hop plantations. The fleas eat up the young shoots, and even after the hop stems have grown 8 or 9 inches long they will devour every leaf and head.

Hop-fly (*Aphis humŭli*), a species of plant-louse very destructive to the hop. The winged female is green with a black head

and bands and spots of black on the body; the legs and wings are long. A few winged females make their first appearance about the middle of May, and wingless myriads by the middle of June. The insects suck the under side of the upper leaflets, and there deposit their young on the most succulent part of the plant. Myriads perish by means of lady-birds and other insects, as well as by their extreme susceptibility to atmospheric changes.

Hophra. See *Apries.*

Hôpital. See *L'Hôpital.*

Hor (JEBEL HAROUN), a mountain of Arabia Petræa, south-east of Palestine, forming part of the range of Seir or Edom, and the scene of the death of Aaron; height, 4800 feet.

Horace. See *Horatius Flaccus.*

Horæ, in classical mythology, the goddesses of the seasons and the order of nature. Their number was indefinite; in Athens two only were worshipped. They are represented as blooming maidens carrying the different products of the seasons.

Horæ Canonicæ, or simply HORÆ, in the R. Cath. Ch. the canonical or appointed hours at which certain hymns and devotions, themselves termed *Horæ* or *Hours*, are performed in monasteries. See *Canonical Hours.*

Horapollo, the alleged author of a work in Egyptian hieroglyphics pretended to have been translated from the Egyptian into Greek. By many authorities the book is supposed to have been written about the 5th century and translated as late as the 15th.

Horatii, three Roman brothers, who, according to tradition, in the reign of Tullus Hostilius engaged three Alban brothers (the Curiatii), in order to decide the supremacy between Rome and Alba. Victory went to Rome, and the sole surviving Horatius was triumphantly conducted back to the city. But his sister had been betrothed to one of the Curiatii, and her demonstrative grief so enraged Horatius that he stabbed her. For this he was condemned to death, but his father and the people begged him off.

Horatius Cocles, a hero of ancient Rome. The Tarquins having, after their banishment, sought refuge with the Etrurian king Porsenna, the latter advanced against Rome (B.C. 507) to restore them. According to tradition Horatius Cocles, along with two companions, held the Sublician bridge against the enemy, while the Romans broke it down behind them. When this was nearly finished he sent back his two companions, and as the bridge fell he plunged into the Tiber with his armour and safely reached the opposite bank.

Horatius Flaccus, QUINTUS, commonly known as HORACE, the greatest of Latin lyric poets, was born near Venusia, in southern Italy, B.C. 65. His father was a freedman, a collector of taxes, and had purchased the farm at which his son was born. When Horace was about twelve years of age his father removed with him to Rome, where he received an excellent education. At the age of eighteen he went to Athens to complete his studies. After the assassination of Julius Cæsar Brutus came to Athens, and Horace, along with other Roman youths, joined his army. He was appointed to a military tribuneship, was present at Philippi, and on the defeat of Brutus saved himself by flight. On the proclamation of an amnesty to the vanquished Horace returned to Italy, but found his father dead, his paternal estate confiscated, and himself reduced to poverty. He was, however, enabled to purchase a clerkship in the quæstor's office, which enabled him to subsist frugally and to cultivate his poetical talent. His poems procured him the friendship of Virgil and Varius, and to them he was indebted for his first acquaintance with Mæcenas, who was the friend and confidant of Augustus Cæsar, and who expended his wealth for the encouragement of literature and the arts. Mæcenas received Horace among his intimate friends, and, after some years, presented him with a small estate or farm in the Sabine country about 15 miles from Tibur (Tivoli), which was sufficient to maintain him in ease and comfort during the rest of his life. He had also a cottage at Tibur, and at Rome or one or other of these country residences the latter part of his life was spent. Although he was ultimately introduced to Augustus he never sought favours from him, and he is said to have declined an offer of the management of his private correspondence. He died in B.C. 8, the same year as his friend and patron Mæcenas. His works consist of four books of odes; a book of epodes or short poems; two books of satires; and two books of epistles, one of which is often cited as a separate work, under the title of Ars Poetica. The lyrics of Horace are largely based on Greek models, but the exquisite beauty of

his language is all his own. It is, however, in his satires and epistles that he shows the greatest power and originality, wit and humour, gravity and gaiety, shrewdness and common sense, tender sentiment, and at times melancholy. His writings have been often translated, and into many languages. In English Pope and Swift have given free imitations of various parts of his writings. The poetical translation of Francis is well known, but is inferior to that of Sir Theodore Martin.

Hörde (heur'dė), a town of the Prussian province of Westphalia on the Emscher, a centre of the iron manufacture, and having large coal-mines. Pop. 14,598.

Horde'olum. See *Stye.*

Hor'deum. See *Barley.*

Horeb (Arabic, *Jebel Músa*, Mountain of Moses), a mountain belonging to the same ridge as Mount Sinai, where is still pointed out the rock from which water issued at the blow of Moses.

Horehound (*Marrubium vulgāre*), a labiate plant, with whitish, downy leaves and stem; flowers small, nearly white, in crowded whorls, possessing an aromatic smell and bitter flavour. It is a popular remedy for coughs and colds, usually as an infusion. It is a native of Britain and Europe generally. Black horehound (*Ballōta nigra*), also a labiate plant, is a malodorous and unattractive weed.



Horehound (*M. vulgāre*).

Horgen, a town of Switzerland, on the lake of Zürich, with some manufactures and a harbour with a considerable trade. Pop. 5268.

Hori'zon, in ordinary speech the line where earth and sky seem to meet, or the circle which bounds that part of the earth's surface visible to a spectator from a given point. This is termed the *sensible*, *visible*, or *apparent horizon*, as distinguished from the *rational* or *celestial horizon*, an imaginary great circle, parallel to the sensible horizon, whose plane passes through the earth's centre, whose poles are the zenith and the nadir, and which divides the sphere into two equal hemispheres. In observations with the sextant at sea, when the real horizon is invisible a small basin containing mercury may serve as an *artificial horizon.* The observation that is then made is the angle between the sun or star and the image of the sun or star in the basin of mercury, and it is easily seen that half this angle is the altitude of the object above the real horizon. In geology, the term is applied to any well-marked formation which suffices as a starting-point from which to study the rest.

Horizon, Dip of. See *Dip.*

Horizontal Parallax. See *Parallax.*

Horn, a general term applied to all hard and pointed appendages of the head, as in deer, cattle, &c., but as a term denoting a particular kind of substance nothing should be called horn which is not derived from the epidermis or outer, layer of the integument, whether on the trunk, hoofs, or head. Horn is a tough, flexible, semi-transparent substance, most liberally developed in the horns of bovine animals, but also found in connection with the 'shell' of the tortoise, the nails, claws, and hoofs of animals, the beak of bird and turtle, &c. Horn is softened very completely by heat, so as to become readily flexible, and to adhere to other pieces similarly softened. True horn consists principally of an albuminoid principle, *keratin*, with a small portion of gelatine and a little phosphate of lime. In some species of animals the males only have horns, as for instance the stag. In cattle both male and female have horns, though there are also hornless cattle. Horns differ widely in the case of different animals. Thus the horns of deer consist of bone, and are deciduous; those of the giraffe are independent bones, with a covering of hairy skin; those of oxen, sheep, and antelopes consist of a bony core covered by a horny sheath. The horns of the rhinoceros alone consist exclusively of horny matter. The horns of oxen, sheep, goats, and antelopes are never shed, except in the case of the prong-horned antelope. The number never normally exceeds four, and in the case of deer the horns are branched.

The various kinds of horns are employed for many purposes. The principal used in the arts are those of the ox, buffalo, sheep, and goat. Deer horns are almost exclusively employed for the handles of knives and of sticks and umbrellas. Those which furnish true horn can be softened by heat (usually in boiling water), cut into sheets of various thickness, which sheets may be soldered or welded together at the edges so as to form plates of large dimensions, and polished and dyed so as to imitate the much more expen-

sive tortoise-shell. The clippings of horn may be welded together in the same manner, and made into snuff-boxes, powder horns, handles for umbrellas, knives, forks, &c. As horn has the valuable property of taking on and retaining a sharp impression from a die, many highly ornamental articles may be turned out. Combs for the hair are made from the flattened sheets, and out of the solid parts of buffalo horns beautiful carvings are made.

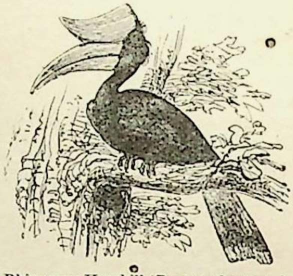
Horn, a musical instrument, originally formed, as the name denotes, from the horn of an animal. The name includes a large family of wind-instruments, many of which have fallen into disuse. The French horn, or simply *the horn*, consists of a metallic tube of about 10 feet in length, very narrow at top, bent into rings, and gradually widening towards the end whence the sound issues, called the *bell*. It is blown through a cup-shaped mouthpiece of brass or silver, and the sounds are regulated by the player's lips, the pressure of his breath, and by the insertion of the hand in the bell of the instrument. As a simple tube, unprovided with holes, the horn yields only the generating note, and of course would be confined to one key; but by means of *crooks* the tube can be lengthened, and transposed into any key. By inserting the hand into the bell, which flattens a note, the sounds awanting are produced. The compass of the instrument is three octaves. Music for the horn is always written on the key of C, an octave higher than it is played, with the key of the composition marked at the beginning of each movement: thus 'corni (or horns) in D' directs the performer which crook he must use to play the notes in the key indicated. The bugle, cornet-a-piston, and sax-horn are allied instruments.

Horn, Cape. See *Cape Horn*.

Horn, Hoorne, or Hornes, Philip, Count van, a Flemish soldier and statesman, born 1518. He was the son of Joseph de Montmorency-Nivelle, and of Anne of Egmont, and stepson of John, count van Horn, who constituted him and his brother his heirs on the condition of assuming his name. Philip gradually rose to be governor of Gueldres and Zütphen, admiral of the fleet, and councillor of state. He fought at St. Quentin in 1557, and at Gravelines in 1558, and in 1559 accompanied Philip to Spain. On his return he joined the Prince of Orange and Egmont in resistance to Philip. On the arrival of Alva at Brussels he was arrested, in Sept. 1567, on a charge of high treason, and he and Egmont were beheaded in June 1568.

Hornbeam (*Carpīnus Betŭlus*, nat. order Cupuliferæ), a small bushy tree common in Britain, and often used in hedges, as it stands cutting and in age becomes very stiff. The wood is white, tough, and hard, and is used in turnery, for cogs of wheels, &c. The inner bark yields a yellow dye. The American hornbeam (*Carpīnus americāna*) is a small tree sparingly diffused over the whole of the United States. The wood is fine-grained, tenacious, and very compact.

Hornbills, a remarkable group of birds (*Bucerotidæ*), confined to Southern Asia and Africa, akin to the kingfishers and the toucans, remarkable for the very large size of the bill, and for an extraordinary horny



Rhinoceros Hornbill (*Bucĕros rhinoceros*).

protuberance by which it is surmounted, nearly as large as the bill itself, and of cellular structure within. The rhinoceros hornbill (*Bucĕros rhinoceros*) is almost the size of a turkey, of a black colour, except on the lower part of the belly and tip of the tail, which are white. It has a sharp-pointed, slightly-curved bill, about 10 inches long, and furnished at the base of the upper mandible with an immense appendage in the form of an inverted horn. The skeleton though bulky is very light, being permeated with air to an unusual degree. During incubation the female is plastered up in the hollow of a tree and fed by the male through a small aperture left for the purpose. The hornbills are of arboreal habit, and feed on fruits; but in captivity they take small reptiles, and the Abyssinian species even attacks snakes.

Hornblende (-blend), or Amphibole, one of the most abundant and widely diffused of minerals, remarkable on account of the various forms and compositions of its crystals

and crystalline particles, and of its exceedingly diversified colours, thus giving rise to almost numberless varieties, many of which have obtained distinct appellations. It is sometimes in regular distinct crystals, more generally the result of confused crystallization, appearing in masses composed of laminæ, acicular crystals, or fibres, variously aggregated. It enters largely into the composition and forms a constituent part of several of the trap-rocks, and is an important constituent of several species of metamorphic rocks, as gneiss and granite. In colour hornblende exhibits various shades of green, often inclining to brown, white, and black, with every intermediate shade; it is nearly transparent in some varieties, in others opaque; hardness about the same with felspar; specific gravity, 3·00. Its chief constituents are silica, magnesia, and alumina. The principal varieties are hornblende proper, divided into three sub-varieties, basaltic hornblende, common hornblende, and hornblende slate; tremolite, actinolite, nephrite, pargasite, and asbestos.

Hornbook, in former times the first book of children, or that in which they learned their letters: so called from the transparent horn covering placed over the single page of which it usually consisted, the whole being fixed to a wooden frame with a handle. It generally contained the alphabet in Roman and small letters, several rows of monosyllables, and the Lord's Prayer. The alphabet was usually prefaced with a cross, or was printed in the form of a cross; hence the term Christ-cross row, corrupted into *criss-cross* row, applied to the alphabet, and by extension to the hornbook.



Hornbook.

Horncastle, a town of England, county of Lincoln, 21 miles east of the city of Lincoln. There is a considerable trade in corn and wool, and one of the largest horse-fairs in the United Kingdom is held annually in August. Pop. 4374.—HORNCASTLE, or South Lindsey, is one of the parliamentary divisions of Lincolnshire.

Horne, RICHARD HENGIST, poet, dramatist, and miscellaneous writer; born 1803, died 1884. He was educated for the army at Sandhurst, entered the Mexican navy, and served during the war between Mexico and Spain. In 1828 he began his literary career, and produced several tragi-comedies of an ironical and satirical kind, and a large quantity of miscellaneous work. In 1843 he made his historic appeal to public judgment by publishing his epic Orion at one farthing. In 1844 A New Spirit of the Age, a critical work in which he was assisted by Miss Barrett (Mrs. Browning) and Robert Bell, appeared. In 1852 he took to gold-digging in Australia, still keeping in touch with his literary work. Of his many writings, the best known are Orion, Cosmo de Medici, The Death of Marlowe, and Prometheus.

Horned-horse, the gnu (which see).

Horned-owl, a familiar name applied to several species of owls having two tufts of feathers on the head supposed to resemble horns. See *Owl*.

Horned-pout. See *Cat-fish*.

Horned-screamer (*Palamedea cornūta*), a South American grallatorial bird having a long, slender, movable horn projecting from its forehead. Its voice is loud and shrill, and is uttered suddenly and with such vehemence as to have a very startling effect.

Horned-toad, a name given to a genus of lizards (*Phrynosōma*), of toad-like appearance, found in America west of the Mississippi. There are nine different species, all more or less covered with spine-like scales.

Horner, FRANCIS, politician and economist, born at Edinburgh 1778, died at Pisa 1817. He studied for the Scottish bar, but, exchanging it for the English bar, took up his residence in London in 1803. He had early, with his friends Jeffrey and Brougham, declared his preference for Whig principles, and in 1806, when Mr. Fox came into office, obtained through ministerial influence a seat in parliament. He became an authority on financial and economic matters; was chairman of the Bullion Committee of 1810, and was mainly the means of checking the evils of an inconvertible paper currency. He was one of the originators of the Edinburgh Review, for which he wrote many articles.

Hornet, an insect of the genus *Vespa* (*V. crabro*), much larger and stronger than the ordinary wasp. It is very voracious, feeding on fruit, honey, &c., and preying on other insects. They form their nest of a kind of paper-work in hollow trees and walls, and are able with their sting to inflict a painful wound, usually accompanied with considerable swelling.

Horning, in Scots law, a writing issuing at the instance of a creditor against his debtor, commanding him in the sovereign's name to pay within a certain time under pain of being "put to the horn" and declared a rebel.

Horn of Plenty. See *Cornucopiæ.*

Horn Silver, native chloride of silver, so called because when fused it assumes a horny appearance.

Hornstone. See *Quartz, Chert.*

Horn-work, in fortification, a work with one front only thrown out beyond the glacis for the purpose of either occupying rising ground, barring a defile, covering a bridge-head, or protecting buildings.

Horol'ogy, the construction of clocks and watches, or branch of knowledge dealing with such. See *Clock* and *Watch*, and also the accompanying plate and descriptive notices.

Ho'roscope, in astrology, a scheme or figure of the twelve houses, or twelve signs of the zodiac, in which is marked the disposition of the heavens at a given time and place, and by which astrologers formerly told the fortunes of persons, according to the position of the stars at the time of their birth. To each of the houses was assigned a particular virtue or influence. The ascendant was that part of the heavens which was rising in the east at the moment; this was the first and most important house, or house of life, and contained the five degrees above the horizon and the twenty-five beneath it. Other houses were those of riches, marriage, death, &c.

Horsa. See *Hengist.*

Horse (*Equus caballus*), a well-known quadruped belonging to the family Equidæ, order Ungulata (hoofed animals), and subdivision Perissodactyla (odd-toed); characterized by an undivided hoof formed by the third toe and its enlarged horny nail, a simple stomach, a mane on the neck, and by six incisor teeth in each jaw, seven molars on either side of both jaws, and by two small canine teeth in the upper jaw of the male, rarely in the female. The family includes also the asses and zebras, and original types appear to have been at one time common in both the Old World and the American continent. No horses existed in America when it was discovered by Columbus, those now found in a wild state there being descendants of those introduced by the Spaniards. But a number of fossil species have been described from America—one of them standing only two and a half feet in height. The descent of the present horse can be traced through several fossil forms back to an animal only about the size of a fox, and having four separate digits or toes on the feet. Subsequent forms show how the third toe developed at the expense of the others till latterly a form identical with the common horse appeared. It is doubtful whether the horse is now anywhere to be found in its native state, the wild horses of the steppes of Tartary and other regions of the Old World being possibly descendants of animals escaped from domestication. The horse was probably first domesticated in Asia, and it varies much in form, size, and character with the climate and nature of the district it inhabits. Arabia produces perhaps the most beautiful breed, which is also swift, courageous, endurant, and persevering. As bred in Britain the horse has attained high perfection. Two breeds—namely, the large, powerful, black breed of Flanders, and the Arabian—have contributed more than all others to develop the present British varieties from the original, comparatively light-limbed, wiry race found by Cæsar. The former laid the foundation of size, strength, and vigour for draught-horses and for those anciently used in war, while the latter conferred speed and endurance. The ladies' palfrey is largely derived from the Spanish genet, a small, beautiful, fleet variety of the Moorish barb. The hunter, characterized by speed, strength, and endurance, represents the old English, Flanders, and Arabian breeds. The race-horse has less of Flemish and more of Arabian blood. Other leading varieties are the Suffolk Punch and Clydesdale, both chiefly of Flanders blood, and the best for draught and agriculture; and several varieties of ponies, as Galloway, New Forest, Shetland, &c. Carriage, riding, and other horses combine the above breeds in varying degrees, as speed, strength, size, &c., are required. Horses are said to have 'blood' or 'breeding' in proportion as they have a greater or less strain of Arab blood. At the age of two years the horse is in a condition to propagate. The mare carries her young eleven months and some days, continues to breed till the age of sixteen or eighteen years, and lives on an average between twenty and thirty years. The various species of the horse family have been artificially crossed by man, and are found to be fertile with each other; the offspring, however, are generally sterile. The horse



HOROLOGY.—FAMOUS CLOCKS.

1. Clock of Houses of Parliament, Westminster. 2. Glastonbury Clock, now in Wells Cathedral. 3. Clock at Hampton Court. 4. Wimborne Clock. 5. Strasburg Cathedral Clock. 6. Clock at Rouen. 7. Clock at Berne. 8. Clock at Venice. 9. Clock at Paris.

HOROLOGY—FAMOUS CLOCKS.

1. **Clock of Houses of Parliament, Westminster.** Designed by Lord Grimthorpe (then Mr. E. B. Denison) and first set going in 1860. The tower is 320 feet high, and the dials are 180 feet from the ground. Each of them is 22½ feet diameter, of opalescent glass set in an iron framework. The hour figures are 2 feet long and the minute spaces 1 foot square. The works contain three trains—one drives the hands, another the mechanism for striking the hours, the third the chimes. The pendulum is fully 13 feet long and weighs nearly 700 lbs. The going part of the clock requires winding once a week, the striking parts twice. The hour bell weighs 13 tons, the quarter bells collectively 8. Though there are clocks with larger dials, this clock is probably the most powerful as well as the most accurate of all large time-keepers. Its variation seldom exceeds a second a week. It cost above £22,000.

2. **The Glastonbury Clock.**—In 1340, Peter Lightfoot, a monk, made for Glastonbury Abbey a clock, which was at the Reformation removed to Wells Cathedral, where some part of it still remains. This was certainly a timekeeper with an escapement and a regulator for securing equable motion, and very different from all previous astronomical and horological machines. In 1835, the mechanism being entirely worn out, the clock was supplied with new works and the dial somewhat remodelled. The outer circle is 6 feet 6 inches in diameter, and the band within is of a blue colour, with gilt stars scattered over it; the hour numerals are painted in old English characters on circular tablets, and are in two series of twelve each. The centre portion of the dial rotates once in a lunar month, showing the phases of the moon through a circular aperture. An index mark on the edge of the rotating centre points to the age of the moon. Emerging from behind the age of the moon circle is a gilt star with a long ray pointing to the minute, and mounted on a stalk is another star to indicate the hour. The minute circle and index were added when the clock was reconstructed in 1835. At the base of the arched pediment which surmounts the square of the dial, is an octagonal projection from which rises a panelled turret. Around this, fixed to two rings of wood, are sets of horsemen which formerly revolved in opposite directions as the hour was struck. The original movement, except that it was controlled by a balance instead of a pendulum, bore a remarkable resemblance to the turret clocks of a few years ago.

3. **The Hampton Court Clock.**—William Derham, the earliest English horological writer, describes an astronomical clock which was placed in one of the towers of Hampton Court Palace in 1541. When in action it showed the rising and setting of the sun, motions of several of the planets, phases of the moon, &c. From some marks resembling the letters N. C., it is conjectured that the maker was Nicholas Cratzen, a Bavarian, who was "deviser of the king's horologeries" in the time of Henry VIII. The dial is all that now remains of the original clock. The works appear to have been repaired several times in the eighteenth century; but for many years in the early part of the present century the clock was idle. The present clock was brought from Old Buckingham Palace in 1835.

4. The Wimborne Clock.—At Wimborne, Dorsetshire, is a very old clock somewhat on the lines of the one in Wells Cathedral, and believed also to have been constructed by Peter Lightfoot.

5. The Strasburg Cathedral Clock.—Of all horological machines the successive clocks at Strasburg Cathedral have, perhaps, attracted the most attention as mechanical curiosities. These have been three in number. The first was constructed about 1352, the second in the latter part of the sixteenth century. Early in the present century it was evident that reconstruction was necessary, and this was ultimately intrusted to Charles Schwilgue, who entered on his task in 1838, and completed it about the middle of 1842. On the 2nd of October of that year the new life of the resuscitated marvel was solemnly inaugurated. On the floor level is a celestial globe indicating sidereal time, and the rising, setting, and passage over the meridian of Strasburg of all stars visible with the naked eye. Behind this is a calendar showing months, days of the month, dominical letters, and all feast-days. Above the calendar is a gallery with allegorical figures representing the days of the week (Sunday, Apollo drawn in a chariot by horses; Monday, Diana drawn by a stag; Tuesday, Mars; Wednesday, Mercury; Thursday, Jupiter; Friday, Venus; Saturday, Saturn) which pass in order from left to right. Above this is a dial for showing ordinary time, a planetarium, and a globe showing phases of the moon. Next come movable figures representing the four ages of man, which strike the second stroke of each quarter on a bell. A genius seated beside the ordinary dial strikes the first note of each quarter with a sceptre; the genius on the opposite side turns an hour-glass at each hour. Death strikes the hour with a bone. Above, a procession of the twelve apostles passes at noon before Christ, bowing at His feet, whilst He makes the sign of the Cross. During the procession a cock perched on the top of the left-hand turret flaps its wings, ruffles its neck, and crows three times.

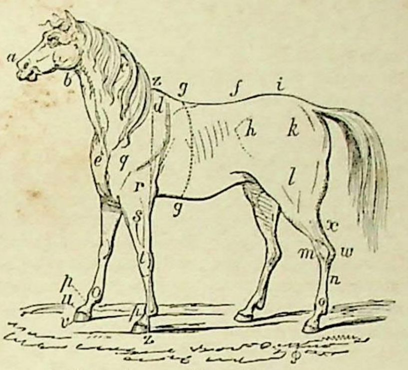
6. Clock at Rouen.—This clock, known as *La Grosse Horloge*, dates from 1517, and is placed in a sort of antique gate-house or porch.

7. Clock at Berne.—This clock, which dates from 1527, presents some curious features. Three minutes before the hour a wooden cock crows and claps its wings; in another minute a procession of bears (*Bären*, referring to the name "Berne") passes round a seated figure of a bearded old man; the cock (above the arch, and to its right) then crows again. The hour is struck on a bell at the top of the tower, by a fool with a hammer, and at each stroke the bearded figure raises his sceptre and opens his mouth, whilst he turns an hour-glass; a bear inclines his head at the same time. Then the cock crows again.

8. Clock at Venice.—This clock, which belongs to the seventeenth century, has a dial of blue and gold, and is surmounted by bronze figures which strike the hours upon a bell. On Ascension Day, and for fourteen days after, figures of the Magi come forth in procession and salute the Virgin and Child (as shown above the dial) when the clock strikes twelve.

9. Clock at Paris.—The Clock of the Palais de Justice at Paris is mainly remarkable for the artistic manner in which it has been treated. Instead of being patched into the building, it has been made the centre of a beautiful scheme of ornamentation.

is, strictly speaking, an herbivorous animal, and is more scrupulous in the choice of his food than most other domestic quadrupeds. The staple diet on which horses are kept is oats and hay, with beans added for horses subjected to heavy work. As a substitute for, or an addition to the regular food, bran, linseed, and carrots are used. The age of a horse can be told by the marks on its teeth, which change a little yearly until the animal is about nine years old, after which period it is difficult to determine the age by mark. In some countries the flesh of the horse is used as food; the hide is made into leather; and the hair of the mane and tail is used for making haircloth, for upholsterers' stuffing, &c.



Horse—Terms applied to different parts.

a, Muzzle. *b*, Gullet. *c*, Crest. *d*, Withers. *e*, Chest. *f*, Loins. *g g*, Girth. *h*, Hip or ilium. *i*, Croup. *k*, Haunch or quarters. *l*, Thigh. *m*, Hock. *n*, Shank or cannon. *o*, Fetlock. *p*, Pastern. *q*, Shoulder-bone or scapula. *r*, Elbow. *s*, Fore thigh or arm. *t*, Knee. *u*, Coronet. *v*, Hoof. *w*, Point of hock. *x*, Hamstring. *z z*, Height.

Horse, Master of the, one of the great officers of the British Court. He has the management of all the royal stables and bred horses, with authority over all the equerries and pages, coachmen, footmen, grooms, &c. In state cavalcades he rides next behind the sovereign.

Horse-artillery, one of the mounted branches of the British service, forming six brigades of the royal regiment of artillery. It acts with the cavalry, the detachments accompanying each gun being mounted on horseback.

Horse-chestnut, a handsome genus of trees or shrubs (*Æscŭlus*) belonging to the nat. order Sapindaceæ, having large opposite digitate leaves, and terminal panicles of showy white, yellow, or red flowers. *Æ. Hippocastănum* (the common horse-chestnut) is familiar to every one. The seeds are large and farinaceous, and have been used as food for animals; they are bitter, and the bark also is bitter, astringent, and febrifugal. The tree is said to have been brought from Constantinople to England in the beginning of the 16th century, and is supposed to be a native of Northern Asia. Three other species are found in North America, where they are popularly known under the name of *Buck-eye*.

Horse-fly, the *Hippobosca equina*, a winged genus of the family Hippoboscidæ, parasitical on the horse.

Horse-guards, the name given to the public office, Whitehall, London, appropriated to the departments under the commander-in-chief of the British army; applied also to the military authorities at the head of the war department, in contradistinction to the civil chief, the secretary-at-war. The name was given to the building from a guard having been kept there by the horse-guards. See *Guards*.

Horse-latitudes, a space in the Atlantic Ocean between the westerly winds of higher latitudes and the trade-winds, notorious for baffling winds and tedious calms.

Horse-mackerel. See *Blue-fish* and *Scad*.

Horsens, a sea-port in Denmark, east coast of Jutland, on a fiord of the same name, 25 miles s.w. of Aarhuus. It has manufactures of tobacco and a good general trade. It is the birthplace of Vitus Behring, the discoverer of Behring's Strait. Pop. 17,290.

Horse-power, the power of a horse or its equivalent; the force with which a horse acts when drawing. The mode of ascertaining a horse's power is to find what weight he can raise and to what height in a given time, the horse being supposed to pull horizontally. From a variety of experiments of this sort it is found that a horse, at an average, can raise 160 lbs. weight at the velocity of 2½ miles per hour. The power of a horse exerted in this way is made the standard for estimating the power of a steam-engine. Thus we speak of an engine of 60 or 80 horse-power, each horse-power being estimated as equivalent to 33,000 lbs. raised one foot high per minute. Engineers differ widely in their estimate of the work a horse is able to execute. That given above is the

estimate of Boulton and Watt based on the work of London dray-horses, but it is considered much too high, 17,400 foot-pounds per minute being generally considered nearer the truth. As it matters little, however, what standard be assumed, provided it be uniformly used, that of Watt has been generally adopted. The general rule for estimating the power of a steam-engine in terms of this unit is to multiply together the pressure in pounds on a square inch of the piston, the area of the piston in inches, the length of the stroke in feet, and the number of strokes per minute, the result divided by 33,000 will give the horse-power, deducting one-tenth for friction. As a horse can exert its full force only for about six hours a day, one horse-power of machinery is equal to that of 4·4 horses. *Nominal* or *calculated horse-power* is a term still used, but of little real value, from its being calculated on steam at a pressure much below the real power exerted. Sometimes the *real, actual*, or *indicated horse-power* exceeds the *nominal* by as much as three to one.

Horse-racing, a sport of ancient origin, having been practised among the Greeks and Romans. The institution of horse-races in England belongs to a very remote period. The first regular horse-races, however, did not take place till the reign of James I. The prize then consisted of a gold or silver bell, whence we have the expression 'to bear away the bell.' The successors of James I. down to Queen Anne were all more or less attached to the sport. Under George I. horse-racing became more and more flourishing, and the sport continued to grow in importance during the remainder of the century. The two most celebrated horses of that period were Flying Childers (foaled in 1715) and Eclipse (foaled in 1764), which long had the reputation of being the fleetest horses that ever ran. The former ran four miles in 6 min. 48 sec., carrying 9 st. 2 lbs. The latter was never beaten. None of the English sovereigns was more devoted to horse-racing than George IV. Between 1784 and 1792, while yet Prince of Wales, he gained 185 prizes, including the Derby of 1788. Horse-racing was introduced into France from England, and during the reign of Louis XIV., and still more during that of Louis XV., was pursued with the utmost enthusiasm. The revolution put an end to it for a time, but the sport was revived by Napoleon. Horse-races, mostly upon the English model, have also been introduced into various other countries. The principal varieties of horse-racing are flat-racing, or racing on level ground; steeple-chasing, or racing over ground not specially prepared for the purpose; hurdle-racing, in which the horses have to leap over obstacles purposely placed in the way; and match trotting. This last kind of race is a very favourite one in America, where the best trotting horses are to be found, but in England it is not much practised. Steeple-chases and hurdle-races take place in the winter months, the chief English event of the season being the *Grand National Steeple-chase*, run over a course of 4 miles 1000 yards at Aintree, near Liverpool. Formerly all races were what is called weight-for-age races, that is, a specified difference in weight was conceded by the older horses. But it was found that when races were conducted on this plan the best horses came to be known, and the inferior ones withdrew, not venturing to compete with them, so that the race resulted in a walk-over. Hence arose the practice of handicapping, that is, of adjusting as nearly as possible the weight to be carried to the previously ascertained powers of the horse, so as to reduce the chances of all the horses entered to an exact equality. Since the introduction of this practice handicap races have become a very favourite sport. The principal weight-for-age for two-year-olds is the Middle Park Plate, and for the three-year-olds the principal for both colts and fillies are the Two Thousand Guineas, the Derby, and St. Leger, and, for fillies only, the One Thousand Guineas and Oaks. The most important handicap races are the Great Northampton Stakes, the City and Suburban and Metropolitan Stakes at Epsom, the Northumberland Plate, the Goodwood Stakes, the Ascot Stakes, the Ebor Handicap (run at York), the Great Yorkshire Stakes (run at Doncaster), the Liverpool Spring, Summer, and Autumn Cups, the Czarewitch, Cambridgeshire, and Newmarket Handicaps (run at Newmarket). The chief racing meetings are those at Ascot in Berkshire, Chester, Doncaster, Epsom, near London, Goodwood, Sandown Park, and Newmarket. At these meetings the stakes run for exceed annually £200,000, but an enormous sum also changes hands in betting. (See *Betting*.) The principal racing meetings in France are those held in spring and autumn at Chantilly and the Bois de Boulogne. The chief events are the Grand Prix de Paris, the Prix du Jockey Club

(the French Derby), and the Prix de Diane (the French Oaks). The rules guiding flat-racing in Britain are framed by the *Jockey Club*, founded in 1750, and whose list of membership includes the names of the leading noblemen and gentlemen of the sporting world. A similar body, the *Grand National Hunt Committee*, govern all steeple-chasing and hurdle-racing events; while the rules of betting are nominally under the control of the Committee of Tattersall's Subscription Rooms. The breeding of thoroughbred horses is often a very profitable business. The pedigrees of all thoroughbred horses are registered in the stud-book, so that if any particular animal is omitted in that register the inference is that its pedigree is not without some blemish more or less remote. Horses have been sometimes sent over from America to compete on the English race-courses, but only with moderate success.

Horse-radish (*Cochlearia Armoracia*), a cruciferous plant inhabiting the temperate parts of Europe, in moist situations. The root is cylindrical, whitish in colour, and forms a well-known condiment, possessing a pungent taste and odour. It is also employed medicinally, as a stomachic, diaphoretic, and diuretic, and externally as a rubefacient.

Horse-radish Tree, an Indian tree (*Moringa pterygosperma*) having pinnate leaves and long three-valved pod-like capsules, from which an oil called *ben-oil* is obtained. The fresh root has a pungent odour and warm taste, much like that of a horse-radish.

Horse-shoe, a shoe for horses, consisting commonly of a narrow plate of iron bent into a form somewhat resembling the letter U, so as to accommodate itself to the shape of the horse's foot. Horse-shoes do not appear to have been known to the ancients. Xenophon, Vegetius, and others mention various processes for hardening the hoofs so as to make them stronger, but say nothing of any protection like the horse-shoe. Iron horse-shoes are mentioned as being in use in Europe in the 9th century of our era. They seem to have been introduced into England by the Normans.

Horse-tail, the general name of plants of the genus *Equisetum*, nat. order Equisetaceæ. The cuticle abounds in siliceous cells, on which account the stems of some species are used for polishing wood. *E. hyemāle*, the greater rough horse-tail or Dutch rush, is best fitted for that purpose, and is largely imported from Holland. Several species are natives of Britain.

Horse-tail, among the Turks and other Eastern nations, the tail of a horse mounted on a lance, and used as a standard of rank and honour. The three grades of pashas are distinguished by the number of tails borne on their standards, three being allotted to the highest dignitaries or viziers, two to the governors of the more important provinces, and one to those of less important districts.



Horse-tail Standard of Pasha.

Horsham, a town of England, in the county of Sussex, on a branch of the river Arun, 37 miles S.S.W. of London, and 22 miles N.W. of Brighton. It formerly sent a member to parliament, and now gives name to a parl. div. of the county. Pop. 8087.

Horsley, Samuel, English bishop, born 1733, died 1806. He was educated at Cambridge, and in 1759 became rector of Newington Butts. In 1767 he was chosen a fellow of the Royal Society, of which he was appointed secretary in 1773. After several charges he was appointed in 1788 Bishop of St. David's, from which he was translated to Rochester in 1793, receiving at the same time the deanery of Westminster; and finally to St. Asaph in 1802, when he resigned his deanery. Dr. Horsley was the greatest theological controversialist of his day, and is famous for his controversy with Priestley on Unitarianism. He published numerous sermons, and several works on Biblical criticism, besides editing an edition of Sir Isaac Newton's works.

Horta, a town in the Island of Fayal, one of the Azores, on the shores of a small bay between two rocky headlands. It has a tolerable harbour, and exports wine, oranges, and grain. Pop. 7446.

Hortense, Eugénie de Beauharnais. See under *Beauharnais*.

Hortensius, Quintus, Roman orator, born of an equestrian family B.C. 114, died B.C. 50. He held many military and civil offices, and was elected consul for the year 69 B.C. In the previous year he had been engaged to defend Verres during the famous prosecution in which Cicero acted for the accusers. Hortensius continued to maintain a generous and friendly rivalry with Cicero, acknowledging his superior oratorical powers without jealousy. His speeches are all lost.

Horticultural Societies, societies formed for the encouragement of both the art and the science of the cultivation of garden plants. The Royal Horticultural Society of London, the first of its kind, was founded by Sir Joseph Banks and others in 1804.

Horticulture (from L. *hortus*, garden, and *colere*, to till), or Gardening, includes, in its most extensive signification, the cultivation of esculent vegetables, fruits, and ornamental plants. In large gardens there are generally separate departments for flowers, fruits, and vegetables; but in small gardens they are usually more or less combined. A garden should be either on a level, but admitting of effectual drainage, or on a gentle slope, preferably on the lower portion of a slope facing the sun. It should be well sheltered, either naturally from situation, or artificially by means of plantations, walls, &c. The character of the soil is of much importance. A good loam, or a sandy loam mixed with humus, is the best. The former is better fitted for fruit-trees, but for early crops the sandy loam is desirable. Whilst the greater part of a garden should consist of such soil, either naturally or artificially formed, it is useful to have a portion stronger and another much lighter in order to suit the requirements of different plants. The nature of the subsoil is also important. The best is a dry bed of clay overlying sandstone. Digging, ploughing, and pulverizing the soil, and exposing the surface to the action of the summer sun and the winter's frost are highly useful operations, by which the tenacity of stiff soils is overcome, weeds and insects are destroyed, and a quantity of air is admitted into the ground. Nutritive matter is frequently supplied to plants in the form of manure, either organic or inorganic. After the soil is properly dry and pulverized, the seeds are deposited, and this should always be done in dry weather, for a dry soil is especially requisite for covering in the seeds. Watering is often necessary as a means of nourishment to growing plants, especially as a support to newly transplanted vegetables, and for cleaning the leaves and destroying insects. The methods of propagating plants are various. For an account of the processes of budding and grafting see these articles. Another mode of propagation is that by means of cuttings, or shoots cut off and planted in the soil, where they take root. This process is exceedingly simple and easy in the case of many trees, as the willows and poplars; but requires some management in the heaths, myrtles, and other shrubs. In growing ornamental plants and flowers and exotic fruits, plant-houses of various kinds are necessary. These comprise the numerous forms of conservatory, plant-stove, greenhouse, pits, and frames. Horticultural tools, instruments, implements, and machinery are very various.

Hortus Siccus. See *Herbarium.*

Horus, the Latinized form of *Har*, the day, or the sun's path, an Egyptian divinity. Two gods were latterly recognized under the name. The elder Horus was the son of Seb (identified by the Greeks with Kronos) and Nu (Rhea) and brother of Osiris. The other Horus was the son of Osiris and Isis, and is supposed to have come into the world soon after the birth of his parents. On the death of Osiris he was his avenger, defeating the serpent Typho, and enabling Isis to thwart his wicked designs. Both the elder and younger Horus were regarded as symbols of the sun.

Horus Apollo. See *Horapollo.*

Hosanna, a word composed of two Hebrew words occurring in Psalm cxviii. 25, signifying 'save now.' The psalm was sung on joyful occasions, and particularly at the feast of Tabernacles. The phrase is used as an exclamation of praise to God, or an invocation of blessings.

Ho'sea, the first in order among the minor prophets of the Old Testament, but probably the third in order of time, flourishing about 750 B.C. Nothing is known of his life, except that he was the son of Beeri, and that his ministry belonged to the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. The nation generally and the ten tribes in particular are reproved, exhorted, and threatened in his prophecy. He predicts the approaching exile of his countrymen, and the consoling promise of the final return of an improved people.

Hoshangábád, chief town and headquarters of district of the same name, Central

Provinces of India, on the Nerbudda. It is a chief seat of the British piece-goods trade, and does business in cotton, grain, &c. Pop. 13,500. The district has an area of 4437 sq. miles, and a pop. of 529,945.

Hoshiarpur, chief town and seat of administration of district of same name, Punjab, India. Pop. 21,552. The district has an area of 2244 sq. miles, and a pop. of 1,011,659.

Hosiery, a general term for all kinds of knitted articles, including drawers, petticoats, night-dresses, &c., and fancy articles such as head-dresses, hoods, shawls, neckerchiefs, watch-guards, cravats, &c. The materials used for the purpose are cotton, linen, and wool, the last of which is sometimes mixed with cotton or silk. Silk is also frequently used alone. Nearly all articles of hosiery, except some fancy articles, are now made by a knitting-frame of some kind or other.

Hosmer, Harriet, American sculptor, born at Watertown, Mass., 1831. She studied at Rome, and among her best-known works are ideal heads of Daphne and Medusa, Puck, the Sleeping Faun, Waking Faun, Beatrice Cenci, &c.

Hospice signifies either a little convent belonging to a religious order, occupied by a few monks, and destined to receive and entertain travelling monks; or houses of refuge and entertainment for travellers on some difficult road or pass, as the Hospice of the Great St. Bernard.

Hospital, any building appropriated for the reception of any class of persons who are unable to supply their own wants, and are more or less dependent upon public help to have those wants supplied. Hence hospitals are of various kinds, according to the nature of the wants they supply and the class of persons for whom they are intended. A large number of hospitals are medical; others are for the reception of incurables; others for the aged and infirm; others for the education of children of people in reduced circumstances; others for the reception of the wounded in battle; and so on. The first establishments of this nature are believed to belong to the 4th century after Christ. Their primary object was to afford a shelter to strangers and travellers, and it was only occasionally that the sick and infirm were admitted. One of the earliest hospitals of which we have any satisfactory information was that established by the emperor Valens at Cæsarea about the end of the 4th century, and which was conducted on a very large scale. The Arabs in Spain, at an early period of their occupation of that country, founded a magnificent hospital at Cordova, where physicians were trained, who did a vast deal to advance the study of medicine. The Arabs have also the credit of having founded the first lunatic asylum in Europe, which was erected in the city of Granada. The majority of hospitals everywhere are medical, often called infirmaries. These may be divided into general and special hospitals, the former class admitting cases of all kinds; the latter class admitting only patients suffering from some special trouble. Thus there are lying-in hospitals, cancer, consumption, ophthalmic, lock (for venereal diseases), fever, and small-pox hospitals. There are also hospitals for children, and for persons suffering from incurable diseases. Such institutions serve a double purpose, inasmuch as they not only afford the best medical advice and treatment to the poor, who would otherwise be unable to obtain it, but also supply the best means of giving instruction in medicine and surgery, as in them students have the opportunity of witnessing cases of nearly every variety of disease, and observing how they are treated by the most skilled physicians and surgeons. For this reason a good infirmary or medical hospital is an indispensable adjunct to every school of medicine and surgery. Hospitals for the sick and hurt are usually divided into wards, each containing a larger or smaller number of beds. Medical and surgical wards are usually kept separate, and all contagious diseases are treated by themselves in distinct buildings. Each hospital has a matron, house surgeon, and apothecary resident within its walls. The duties of the matron consist in regulating the night and day nurses, and the washing and laundry department, as well as the purchase of the necessary supplies of provisions, and keeping a general superintendence over the kitchen and messes of the sick. The house surgeon takes care of all casualties and accidents in the absence of the principal surgeons. The apothecary takes care of the pharmacy and prepares all the medicines prescribed from time to time by the surgeons and physicians. There is a well-lighted room set apart for the performance of operations, and a mortuary for the reception of corpses previous to interment. The nurses relieve each other day and night in a regular manner. Particular wards are set

aside for the reception of persons labouring under various and peculiar denominations of disease. It has been objected to the present plan of constructing large edifices for hospital purposes, that the benefit they confer is greatly diminished by the risk of being attacked by hospital diseases, fever, erysipelas, pyæmia, &c., to which the patients are exposed; and the cottage or hut system of construction has been strongly advocated. This form of hospital consists of temporary detached huts or cottages which could be easily removed or replaced. Difficulties in connection with expense and administration have made this system impracticable. The pavilion system of construction is a compromise between the large blocks and the cottages or huts. According to this system the wards should be separated from the administrative part of the establishment, and should be arranged in pavilions of one story where practicable, but never more than of two. The pavilions should always surround the administrative blocks. This mode of construction is equally applicable to large and small establishments. The Royal Infirmary of Edinburgh, the Herbert Hospital of Woolwich, and the New York Hospital are among the best examples of the pavilion style. Convalescent homes, where patients are reinvigorated by a short stay after being cured in the infirmary, may be regarded as supplementary to medical hospitals, and among subsidiary institutions are dispensaries (which see) and schools for the training of nurses.

Military and Naval Hospitals, or establishments for the reception and care of sick and wounded soldiers and seamen, have been in existence in all civilized countries for a long period. Military hospitals are either permanent or temporary establishments. The chief military hospitals in Britain are the Royal Victoria at Netley, the Herbert at Woolwich, and the Cambridge at Aldershot, besides the station hospitals with a fixed staff at the headquarters of the various military districts. Temporary hospitals are any available buildings in the immediate vicinity of the scene of operations. The chief naval hospitals of Britain are those of Haslar at Portsmouth (the largest in the country), the Royal at Plymouth, and the Melville at Chatham, besides those at the chief naval stations abroad, such as Malta, Halifax, Bermudas, Jamaica, the Cape, Hong-Kong, &c. *Hospital ships* are ships fitted out as hospitals in all expeditions beyond the sea. They serve either as stationary hospitals or, if the sick accumulate, can sail home, or to the nearest station.

After medical hospitals of all kinds, the next most numerous are perhaps those intended for the education of children of parents in reduced circumstances, such as Christ's Hospital in London, usually known as the Blue-coat School, and many others. Another numerous class of hospitals are those for the reception of aged men and women. Many of these are reserved for decayed members of particular professions. Among the other kinds of non-medical hospitals the only ones which it is necessary to mention here are foundling hospitals and orphan hospitals. On the subject of hospitals for the insane, see *Lunatic Asylums*.

Hospital Fever is a malignant form of typhus fever, so called from its being most frequently met with in military and other large hospitals. See *Typhus Fever*.

Hospitallers, charitable brotherhoods who devote themselves to tend the sick in hospitals. The name is specially applied to an order of knights, the Knights of St. John. See *John, Knights of St.*

Hos'podar, a title of dignity formerly borne by the vassal princes of Moldavia and Wallachia, and in earlier times by the princes of Lithuania and the kings of Poland.

Host (Latin *hostia*, a sacrificial victim), a term used for the bread (or wafer) and wine in the eucharist, as containing the body and blood of Christ. As the wafer alone is given to laymen in the R. Catholic Church, as containing both the body and blood of the Redeemer, the term *host* is usually applied to the consecrated wafer. See *Elevation, Mass*.

Hostage, a person left as pledge or surety for the performance of the articles or conditions of a treaty. The taking or giving of hostages is now scarcely known in the relations of modern communities, but was formerly almost universal, and many questions in the law of nations arose out of the practice. If the stipulated terms were observed the hostages were returned on each side, but if the terms were violated or evaded the hostages might be put to death.

Hostilius. See *Tullus Hostilius*.

Hot-bed, in gardening, a bed of earth heated by fermenting substances, such as fresh stable dung, tanners' bark, leaves of trees, &c., and covered with glass to defend it from the cold air, intended for raising

early plants, or for nourishing exotic plants of warm climates, which will not thrive in cool or temperate air.

Hothouse, a building for the cultivation of plants too delicate to grow in the open air. It is built chiefly of glass, and resembles a greenhouse in its structure and arrangements, except that artificial heat is kept up all the year round. Some are heated by steam, others by hot water in tubes, and others by the introduction of hot air.

Hotspur. See *Percy*.

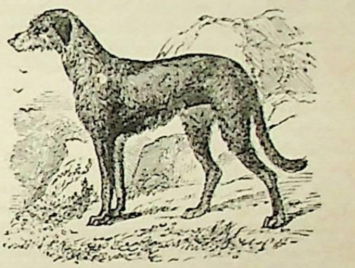
Hot'tentots, a peculiar African race, supposed to be the aboriginal occupants of the south end of that continent, at and near the Cape of Good Hope. Their limits may be said to have been the river Orange on the north and north-east, and the Kei on the east. When young they are of remarkable symmetry; but their faces are ugly, and this ugliness increases with age. The complexion is a pale olive, the cheek-bones project, the chin is narrow and pointed, and the face consequently is triangular. The lips are thick, the nose flat, the nostrils wide, the hair woolly, and the beard scanty. When the Dutch first settled at the Cape in the middle of the 17th century the Hottentots were a numerous nation, of pastoral and partially nomadic habits, and occupied a territory of 100,000 square miles. At the present day this race is nearly extinct within the wide territory which formerly belonged to it, having been entirely hunted out and dispersed by the Boers. Amongst the offshoots of the Hottentot race are the Griquas, descended from Hottentot mothers and Dutch fathers, living to the north of the Orange river. They are semi-civilized, and have some towns and villages. The Koras or Korannas, higher up the river Orange or Gariep, still remain a favourable specimen of the Hottentot race. They are taller, stronger, and more cleanly than the tribes further west. Other tribes are the Gonas or Gonaquas, much mixed with the Amakosa Kaffres; the Namaquas, dwelling towards the mouth of the river Orange; the Hill Damaras, farther north. The Bosjesmen or Bushmen are a degraded tribe of Hottentots. The language of the Hottentots is peculiar, consisting of a system of clicks or clucks.

Hottentot's Bread. See *Testudinaria*.

Houghton (hō'tun), RICHARD MONCKTON MILNES, LORD, only son of Robert Pemberton Milnes, of Fryston Hall and Great Houghton, was born in Yorkshire in 1809, and educated at Cambridge. He made some reputation as a writer of verse, essays, memoirs, &c., but it was rather his social and conversational powers, and his kindly patronage of literary aspirants, than the merit of his writings which gave him his prominent position in London society. In 1837 he entered parliament as member for Pontefract, at first as a Tory, but afterwards as a supporter of Russell and Palmerston. He was an active member of numerous learned societies and institutions, president of the Royal Society of Literature, trustee of the British Museum, foreign secretary of the Royal Academy, &c. He died in 1885.

Houghton-le-Spring, a market town of England, in the county of Durham, 6½ miles N.E. of Durham (also a parl. div.). Its prosperity depends on the numerous coal-mines in the neighbourhood. Pop. 6476.

Hound (*Canis sagax*), a name given generally to hunting dogs; but restricted by scientific writers to such as hunt by scent, a definition which excludes the greyhound.



Deer-hound (*Canis sagax*).

Amongst the varieties are the bloodhound, staghound, foxhound, harrier, and beagle. Hounds are distinguished not only by their fineness of scent, but by docility and sagacity. Of the rough-haired and smooth-haired varieties the former manifest the greatest affection for man.

Hounds-tongue, a plant, so called from the shape of its leaves. See *Cynoglossum*.

Hounslow, a town of England, in Middlesex, 9 miles south-west of Hyde Park Corner, London. The adjoining Hounslow Heath, once notorious for the highway robberies committed on it, is now entirely inclosed, and is the site of large cavalry barracks and extensive powder-mills. Pop. 12,863.

Hou-Pe, HU-PEH, or HOO-PE (North of the Lakes), a central province of China. It is intersected by the Han-kiang and the Yang-tse-kiang, and is considered one of the most fertile parts of the empire. Pop. 33,365,005.

Hour, the twenty-fourth part of a day (see *Day*). In most countries the hours are counted from midnight to mid-day, and twelve hours are twice reckoned. But in some parts of Italy twenty-four hours are counted, beginning with sunset, so that noon and midnight are every day at different hours. Each hour is divided into sixty minutes, and each minute into sixty seconds.

Hour-circle. See *Globe.*

Hour-glass, an instrument for measuring time, consisting usually of two hollow bulbs placed one above the other, and having a narrow neck of communication through which a certain quantity of dry sand, water, or mercury is allowed to run from the upper to the lower bulb, the quantity of sand being adjusted so as to occupy an hour in passing from one bulb to the other. The hour-glass was commonly used in churches during the sixteenth and seventeenth centuries to regulate the length of the sermon.

Houris (hou'riz or hō'riz), the 'black-eyed' nymphs of Paradise, whose company, according to the Koran, is to be one of the rewards of the faithful. They are described as most beautiful virgins, endowed with perpetual youth, and subject to no impurity. They dwell in beautiful gardens, by flowing streams, and the very meanest of the faithful will have at least seventy-two of them.

Hours. See *Horæ.*

Hours, CANONICAL. See *Horæ canonicæ.*

House. In point of law, the common expression, 'an Englishman's house is his castle,' is in most instances true. Except where there has been a criminal offence, an Englishman can hold his house against all comers. No bailiff can break open his door to arrest him, or seize his goods for debt, nor can any court give him this power; but if a bailiff is once permitted to enter he cannot be expelled. Scottish law does not give the householder such a strong position. A Scottish court can give a messenger permission to force a door, and arrest or distrain as may be wished. Breaking into a house by night with the intent to rob is *burglary.*

House-breaking. See *Burglary.*

House-fly. See *Fly.*

Household Gods, amongst the Romans, deities known as the Lares and Penātes, and presiding over the fortunes of the house or family.

Household Suffrage, suffrage based on the occupancy of a house or a distinct part of a house for not less than a year. In Britain it was established in boroughs by the Reform Act of 1867, and extended to the counties in 1884. Lodgers occupying lodgings which would let unfurnished for £10 a year are also entitled to rank under this suffrage.

Household Troops. See *Guards.*

Household Words, a weekly periodical started in 1850 by Charles Dickens. The title is from Shakspere, Henry V., act iv. sc. 3. It was discontinued in 1859 on account of a dispute between Dickens and the publishers.

Houseleek (*Sempervīvum tectōrum*, nat. order Crassulaceæ), a succulent plant, common in Britain, and growing on old walls, the roofs of cottages, &c. The stem rises to the height of 8 or 10 inches, and bears a few purplish flowers, which have twelve or fifteen petals. The leaves are applied by the common people to bruises and old ulcers.

Housemaid's Knee, an acute inflammation of the bursa or sac between the knee-pan and the skin, so called because it is common amongst housemaids from their kneeling on hard damp stones. It is treated like other local inflammations by fomentations, and if necessary leeches. Mild purgatives are also useful, and the limb ought to have complete rest.

House of Commons. See *Britain*—section Parliament; also *Parliament.*

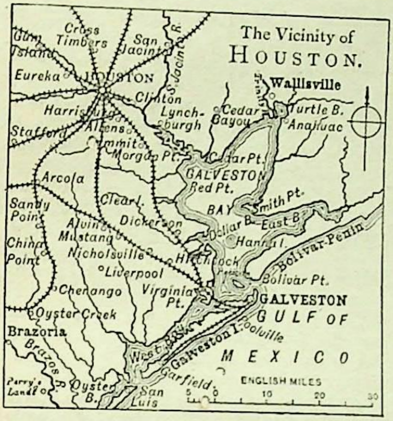
House of Correction, a prison for idle and disorderly persons, and certain classes of criminals, such as prisoners convicted of felony or misdemeanour, vagrancy, &c., or committed on charge of such. Originally vagrants, trespassers, and convicted persons were detained in these houses that they might be compelled to work. They are sometimes called *bridewells.* In England every county must have one, and few of the larger cities and towns are without them.

House of Lords. See *Britain;* also *Parliament.*

Houssa, or HAUSSA (hous'sa), a region of Africa, in Central Soudan, between lat. 11° and 14° N.; and lon. 4° and 11° E. This country, though yet little known, is represented as extremely fertile, and skilfully cultivated. It is under the rule of the Fellatahs, who have subjected the native inhabitants, the

Haussana or Haussas, a race intermediate between the negroes and the Berbers, but generally ranked with the latter. They are intelligent and lively, expert weavers as well as agriculturists, and well acquainted with tanning and working in iron. Their language is rich and sonorous, and has become the general medium of commercial intercourse in Central Africa. They are Mohammedans. There are two large towns in Houssa—Sokoto and Kashna.

Houston, a town of the United States, in Texas, capital of Harris county, at the head of steamboat navigation on Buffalo Bayou, 48 miles north-west of the important



seaport of Galveston, and the great railway centre of the state. It stands in an excellent grazing district, and contains iron-foundries, cotton-presses, machine-shops, and other industrial establishments. It is a great shipping port for cotton. Pop. (1890), 27,557.

Hovas, a native race of Madagascar (which see).

Hoveden, Roger de, an English historian, who probably received his name from Hoveden or Howden, in Yorkshire. The exact dates of his birth and death are unknown, but he flourished in the reign of Henry II., and entering the church, was for some time professor of theology at Oxford. After the death of Henry he applied himself to compiling English Annals, commencing at 731, the period at which Bede finished, and bringing down affairs to 1201. A translation from the original Latin has been published in Bohn's Antiquarian Library.

Howard, the patrician house that has been for centuries at the head of the English nobility. The first of the family of whom anything is certainly known is Sir William Howard, chief-justice of the common pleas under Edward I. and Edward II. His grandson, Sir John Howard, possessed extensive property in Norfolk, and was also sheriff of the county. His grandson, Sir Robert Howard, by marrying the co-heiress of the Mowbrays, dukes of Norfolk, greatly increased the family possessions, and enhanced the family importance. Their only son, Sir John Howard, distinguished himself in the wars with France in 1452-53, and in 1470 was created Lord Howard, and made captain-general of the royal forces at sea. Adhering to the fortunes of Richard III. he was in 1483 created Duke of Norfolk, and elevated to the high dignity of Earl-marshal of England, but two years after he was killed at Bosworth Field, and his blood and honours were attainted by parliament, 1485. A like attainder was decreed against his son Thomas, who had been created Earl of Surrey by Richard. Thomas, however, was restored to his titles and possessions, manifested high military talent, and distinguished himself, especially by his defeat of James IV. of Scotland at Flodden in 1513. His son Thomas, third duke of Norfolk, obtained distinction both as a naval and military commander, and became High-admiral of England. But in spite of his services both at home and against the Scots and the French, Henry VIII. at last condemned him, on slight grounds, to suffer the death of a traitor. The death of Henry prevented the execution, and he was reinstated in his rank and property by Queen Mary, and died in August, 1554. By his marriage with a daughter of Edward IV. he became the father of the ill-fated and accomplished Henry Howard, earl of Surrey, the best English poet of his age. (See *Surrey, Earl of.*) Thomas, fourth duke of Norfolk, entertained the project of marrying Mary Queen of Scots, which led to him being convicted of high treason, and beheaded in 1572. The attainder was reversed and the family honours restored, partly by James I. and partly by Charles II. The ducal house of Norfolk has thrown out many branches which have enjoyed, or still enjoy, the earldoms of Carlisle, Suffolk, Berkshire, Northampton, Arundel, Wicklow, Norwich, and Effingham, and the baronies of Bindon, Howard de Walden, Howard of Castle Rising, and Howard of Glossop. As connected

with this noble family we may mention Lord Howard of Effingham, who defeated the Spanish Armada in 1588; Catherine Howard, one of the ill-fated consorts of Henry VIII.; and Sir Thomas Howard, who died in the Tower a prisoner, for having aspired to the hand of the Lady Margaret Douglas, daughter of Margaret, queen-dowager of Scotland, and niece of Henry VIII. 'The blood of the Howards' has become proverbial, as expressive of ancient lineage combined with high rank.

Howard, John, English philanthropist, was born in 1726, and died in 1790. His father, a wealthy London tradesman, died when his son was about 19 years of age, and left him an independent fortune. In 1756 Howard undertook a voyage to Lisbon to view the effects of the recent earthquake. The vessel in which he embarked being captured, he was consigned to a French prison. The hardships he suffered and witnessed previously to his release first roused his attention to the subject of his future researches. In 1773 he resolved to devote his time to the investigation of the means of correcting the existing abuses in the management of prisons. With this view he visited most of the English county jails and houses of correction, and in March, 1774, he laid the result of his inquiries before the House of Commons, for which he received a vote of thanks. In 1775 and 1776 he visited many of the continental prisons, as well as those of Scotland and Ireland; and the substance of his investigations appeared in a work he published in 1777. This work was supplemented by his experiences of foreign prisons (1778–1783). In 1789 he published an Account of the Principal Lazarettos in Europe, with notes on Continental and British prisons and hospitals. In the same year he made a final journey through Germany and Russia, when prisons and hospitals were everywhere thrown open for his inspection as a friendly monitor and public benefactor. He died of fever at Cherson in South Russia.

Howe, Elias, an American inventor, was born in Spencer, Massachusetts, in 1819, died at Brooklyn in 1867. He constructed a sewing-machine in 1846, and was for several years involved in expensive and harassing lawsuits to establish his right to reap the benefits of his own ingenuity. Immense numbers of the Howe sewing-machine are now manufactured and sold in America, Great Britain, and elsewhere.

Howe, Richard, Earl Howe, English admiral, was the second son of Emanuel Scrope, second Viscount Howe, and was born in 1725, died 1799. He joined the navy at the age of fourteen, and served under Anson till 1745, when, though only twenty years of age, he obtained the command of the *Baltimore* sloop of war, in which he took part in the siege of Fort William, during the last Jacobite rebellion. In 1758 he reduced Cherbourg, and in the same year succeeded to the title of Viscount Howe. Having greatly distinguished himself on many occasions, and risen to be vice-admiral of the blue, he was in 1782 created an earl. In the course of the same year he sailed to the relief of Gibraltar, which he effected in spite of the combined fleets of the enemy. In 1783 he accepted the post of first lord of the admiralty, which, with a partial intermission, he continued to hold until 1793, when, on the breaking out of the war with France, he took the command of the British fleet, and bringing the enemy to an action on June, 1, 1794, he obtained over them a decisive victory, for which he received the thanks of parliament and other honours. In 1797 Lord Howe exerted himself with great success to quell the mutiny among the seamen at Portsmouth.

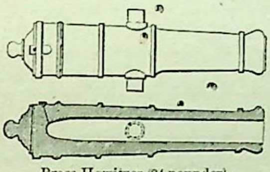
Howells, William Dean, an American novelist, born at Martinsville, Ohio, in 1837. He learned the printer's trade with his father; was afterwards assistant editor on the Ohio State Journal; published a life of Abraham Lincoln and a volume of poems; was appointed in 1861 U.S. consul at Venice. On his return to America in 1865 he joined the staff of the Nation, became afterwards editor of the Atlantic Monthly (1871–81), but made himself known chiefly as a writer of novels. Amongst his works are Venetian Life (1866), Italian Journeys (1867), A Chance Acqaintance (1873), A Foregone Conclusion (1874), The Lady of the Aroostook (1879), Dr. Breen's Practice (1883), A Modern Instance (1883), The Rise of Silas Lapham (1885), Indian Summer (1886).

Howitt, Mary, English writer, born 1805, the daughter of Mr. Botham, a Quaker; was married in 1823 to Mr. William Howitt (see next article). Mary Howitt wrote a number of hymns and ballads, several volumes in prose and verse for children, and translated Miss Bremer's works and H. C. Andersen's Improvisatore. Amongst her writings for the young may be mentioned The Children's Year, The Dial of Love, A

Treasury of Tales for the Young, &c. In conjunction with her husband she also wrote The Literature and Romance of Northern Europe, and Ruined Abbeys of Great Britain. She died in 1888. Shortly before her death she joined the R. Catholic Church.

Howitt, William, born in 1792 of a Quaker family; began early to publish verses, and in conjunction with his wife (see above article) published shortly after their marriage a volume of poems—The Forest Minstrel (1823). In 1831 appeared his Book of the Seasons, in 834 his History of Priestcraft, and in 1838 his popular Rural Life in England. In 1840 the Howitts settled at Heidelberg, and devoted themselves to introducing the literature of the north, especially of Sweden, to English readers. Student Life in Germany appeared in 1841, Rural and Domestic Life in Germany in 1842. In 1847 Mr. Howitt published his Homes and Haunts of the British Poets, and, after a visit to Australia, his Land, Labour, and Gold; and The History of Discovery in Australia. He also wrote a History of England. Latterly both Mr. Howitt and his wife became converts to spiritualism. He died in 1879.

Howitzer, a short piece of ordnance, usually having a chamber for the powder narrower than the bore, specially designed for the horizontal firing of shells with small



Brass Howitzer (24 pounder).

charges, combining in some degree the accuracy of the cannon with the calibre of the mortar, but much lighter than any gun of the same capacity. The rifled gun, throwing a shell of the same capacity from a smaller bore, and with much greater power, has superseded the howitzer for general purposes.

Howler Monkey (*Mycētes*), a genus of South American monkeys, characterized by a remarkable loudness of voice, which is due to the presence of a large chamber within the hyoid bone and the enlargement of the ventricles of the larynx. In the tropical forests of America their hideous howls, probably a kind of amorous concert, may be heard during the night more than a mile away. They are prehensile-tailed, large, and heavy of body, with a high pyramidal head flattened on the summit.

Howrah, a town of India, on the right bank of the Hugli, opposite Calcutta, of which it is practically a suburb, and with which it communicates by a floating bridge. It has large dockyards, jute and saw mills, and various manufactories. Pop. 116,606.

Howth, a small town in Ireland, county of Dublin, 9 miles E.N.E. of Dublin, on the north side of the Hill of Howth, a peninsula at the entrance of Dublin Bay. Pop. 909.

Höxter (heuk'stėr), a town of Westphalia, Prussia, on the left bank of the Weser, once a Hanse town. Pop. 6036.

Hoy, a small vessel, usually rigged as a sloop, and employed in carrying goods and passengers short distances coastwise, and sometimes in conveying goods to and from larger vessels and the shore.

Hoy, an island of the Orkneys, Scotland, separated from the mainland of Scotland by the Pentland Firth, and from the largest island of the Orkneys, known as Mainland, by the Sound of Hoy. It is about 13 miles long and 6 broad; mountainous and heathy, but with fertile tracts. It has an excellent harbour, Long-Hope. At the south-west of the island there is a detached pillar of rock 450 feet high, known as the Old Man of Hoy. Pop. 1320.

Hoya, a genus of Asclepiadaceæ, common in tropical Asia, and cultivated in hothouses on account of their ornamental appearance.

Huamanga. See *Guamanga.*

Huana'co. See *Guanaco.*

Huanu'co Bark, the grey or silver cinchona bark imported in the form of quills from around Huanuco in Peru. It is the produce of *Cinchona micrantha.*

Hubble-bubble. See *Narghileh.*

Huber, François, a Swiss naturalist, born in 1750, died in 1831. Notwithstanding the loss of his eyesight, he was able, by the help of his wife and his reader and amanuensis, to make observations and deductions which constitute decidedly the most important contribution by any one man to our knowledge of bees. His first work was published in 1792 under the title of Lettres à Ch. Bonnet. Four years after his Nouvelles Observations sur les Abeilles, practically a new edition, enlarged and amended of the other, appeared. His son Pierre also as-

sisted his father, and himself published important observations on ants.

Hubert, St., the Apostle of Ardennes, a saint of the Roman Catholic Church, the patron of huntsmen. He was of a noble family of Aquitaine. While hunting in the forests of Ardennes he had a vision of a stag with a shining crucifix between its antlers, and heard a warning voice. He was converted, entered the church, and eventually became Bishop of Maestricht and Liége. He worked many miracles, and is said to have died in 727 or 730.

Hubertsburg, formerly a hunting seat of the electors of Saxony, in the Leipzig district, now enlarged and divided into portions, used respectively as a public prison, a hospital, a lunatic asylum, &c. Here the Peace of Hubertsburg, which put an end to the Seven Years' war, was signed February 15, 1763.

Huc (ük), Évariste Régis, French missionary and traveller, born in 1813. After studying theology, about 1837 he entered the order of the Lazarist Fathers, was ordained priest in 1838, in 1839 went to China as a missionary, and in company with Père Gabet made a journey of exploration in the interior of the empire and of Thibet. After this he returned in broken health to France, where he published Souvenirs d'un Voyage dans la Tartarie le Thibet et la Chine pendant les Années 1844, 1845, et 1846; L'Empire Chinois (1857); Le Christianisme en Chine (1857). Huc died in Paris in 1860.

Huckleberry, an American name for the whortleberry (which see).

Huddersfield, a flourishing manufacturing town, in the West Riding of Yorkshire, England, 16½ miles south-west of Leeds. The plan of the town is very regular, and the houses are well though somewhat uniformly built. Some of the public buildings are elegant structures. Amongst its institutions are two colleges for higher education, a technical school, &c. The town is the chief centre of the fancy woollen trade. Broadcloths, doeskins, trouserings are also manufactured, and there are manufactories of steam-engines, machinery, &c. It returns one member to parliament. Pop. 96,495.

Hudson, a town and port, United States, in the state of and 116 miles north of New York, on the left bank of the Hudson. It is regularly built, and has large iron-smelting works, foundries, breweries, &c. Pop. 9970.

Hudson, Henry, English navigator, date of birth unknown. He sailed from London in the year 1607 in a small vessel, with only ten men and a boy, to discover the North-east Passage, and proceeded beyond the 80th degree of latitude. In a second voyage he landed at Nova Zembla, but could get no further eastward. In 1609 he sailed for N. America, and discovered the Hudson River, which he ascended about 50 leagues. In 1610 he sailed in an English ship named the *Discovery*, and discovered Hudson Strait and Hudson's Bay, where he wintered; but his crew, after suffering many hardships, mutinied and set him adrift in a boat along with his son John and seven of the most infirm of the crew, none of whom were ever again heard of. Hudson published Divers Voyages and Northern Discoveries (1607), and a Second Voyage (1608).

Hudson Bay, or Hudson's Bay, an extensive bay, or rather an inland sea, Dominion of Canada, extending between lat. 51° and 64° N., and lon. 77° and 95° W.; length, north to south, about 800 miles; greatest breadth, about 600 miles. Hudson Bay is navigable for 4½ months in summer (from middle of June to end of October), being obstructed by drift-ice during the rest of the year. There are many islands, reefs, and sand-banks. The shores on the east are high and bold; but those on the west, especially towards the south, are low and level, and much of the land here is favourable for stock and dairy farming. The white whale is found in its waters, and there is a considerable summer fishery.

Hudson River, a river in the United States. It rises, by two branches, in the northern part of the state of New York, in the Adirondack Mountains, about lat. 44° N. Two small streams unite to form the river, which is afterwards joined by the Schroon and Sacondaga. At Glen's Falls it has a fall of 50 feet, after which it runs almost due south to its mouth in New York Bay. Its whole course is over 300 miles; it is navigable as far as Hudson, 118 miles, for the largest vessels. The banks of the Upper Hudson are high and rocky; and the scenery very picturesque.

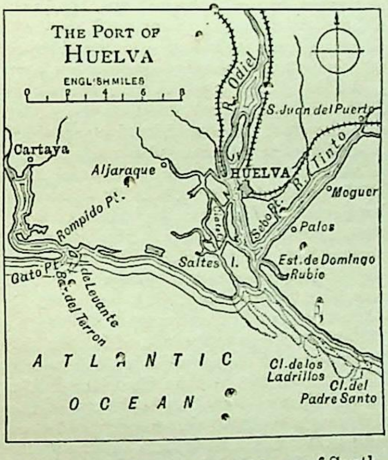
Hudson's Bay Company, an English trading company, chartered May 2, 1670. It had long a monopoly of the trade throughout the whole territory of N. America whose streams flow into Hudson's Bay, and at one time as far westward as the Pacific, with rights of governing and making war. In 1870 its authority was transferred by act of

parliament to the crown, and its territories incorporated in the Dominion of Canada. Its trade in furs is still very large. See *Fur Trade*.

Hudson's Bay Territory. See *North-west Territories*.

Hué, the capital city of Anam, on the river Hué, which is here navigable for small craft, 10 miles from its mouth in the Gulf of Tonquin. It was fortified in the present century in European style by French officers in the service of the king of Cochin-China. The circumference of the walls is upwards of 5 miles. The city has a considerable trade. Pop. 50,000.

Hue and Cry, in English law, the pursuit of a felon or offender, with loud outcries or clamour to give an alarm. This procedure is taken by a person robbed, or otherwise injured, to pursue and get possession of the culprit's person. At common law, a private person who has been robbed, or who knows that a felony is committed, is bound to raise hue and cry under pain of fine and imprisonment. This is generally done by informing the nearest constable; and this process is still recognized by the law of England as a means of arresting felons without the warrant of a justice of the peace. The same name is also applied to a paper circulated by the secretary of state for the home department announcing the perpetration of offences.



Huelva (u̧-el'vȧ), a seaport town of South-western Spain, capital of the province of same name in Andalusia. It has wide and well-built streets. There are manufactures of matting, ropes, sails, &c., a large trade in the exportation of copper ore; also in fruits and wine. The fisheries, mainly sardine and tunny, are of considerable value. Pop. 18,195.—The province of Huelva is mountainous and well wooded in the north, and contains celebrated copper mines. In the south it is comparatively level, and has a rich alluvial soil. Pop. 221,062.

Huesca (u̧-es'kȧ; ancient, *Osca*), a town of Spain, capital of the province of Huesca, on the Isuela. It is beautifully situated on an eminence in a fertile plain, has well-paved streets, a magnificent Gothic cathedral dating from the 13th century, an ancient royal palace, and a circus for bull-fights. Pop. 10,477.—The province of Huesca is rugged and mountainous in the north, but has much fertile and comparatively level land in the south. Pop. 261,003.

Huet (ü-ā), PIERRE DANIEL, a French critic and classical scholar, was born at Caen, Normandy, in 1630, and educated at the Jesuits' college there; afterwards went to Paris; accompanied Bochart to the court of Queen Christina of Sweden; was appointed in 1670 sub-preceptor under Bossuet to the dauphin, and superintended the celebrated Delphin series (ad usum Delphini) of the Latin classics. After the completion of his tutorship, having taken holy orders, he was made Abbot of Aulnai, and subsequently nominated Bishop of Soissons, which see he exchanged for that of Avranches, but latterly retired to an establishment of the Jesuits at Paris, where he died in 1721. Amongst his writings are Carmina Latina et Græca, De Interpretatione, a treatise on translation; Sur l'Origine des Romans, Censura Philosophiæ Cartesianæ, Histoire du Commerce et de la Navigation des Anciens, a book still of great value.

Hugh Capet. See *Capet*.

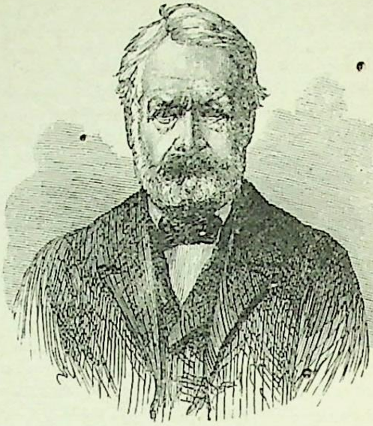
Hughes, THOMAS, an English barrister, author, and philanthropist, born at Uffington, Berkshire, in 1823. He was educated at Rugby under Dr. Arnold, and afterwards at Oxford. In 1848 he was called to the bar, and in 1869 became a queen's counsel. He is widely known by his novel, Tom Brown's School-days, a picture of school life at Rugby, published in 1856. It was followed by Tom Brown at Oxford (1861), A Layman's Faith (1868), Alfred the Great (1869), The Manliness of Christ, and other writings. He was one who devoted much time to the social elevation of the work-

ing-class, encouraging in particular the co-operative system. In 1865-68 he was member of parliament for Lambeth, and in 1868-74 for Frome. He was latterly a county-court judge. He died in 1896.

Hugli, or HOOGHLY (hög'li), a river of Hindustan, in Bengal, formed by the junction of the Bhagirathi and the Jalangi at Nadija, about 55 miles above Calcutta. It is 15 miles wide at its mouth, but much encumbered by shoals. At Calcutta it is about a mile wide, and has rapid and violent tides. The south-west monsoons produce a 'bore' in the Hugli, that is, a tidal wave which rushes up the river at the rate of 15 or 20 miles an hour. Ships drawing 26 feet ascend as far as Calcutta. Total course about 200 miles.

Hugli, a town of Hindustan, in Bengal, on the Hugli river, 22 miles north from Calcutta. Hugli is said to have been founded by the Portuguese in 1537. It was made the seat of a British factory in 1676, but declined in importance as Calcutta rose. An important iron railway bridge connecting the East India railway system with that of the Eastern and Northern Bengal railway crosses the river near the town. Pop. 33,060.

Hugo (ü-gō), VICTOR MARIE, a French poet and novelist, born February 26, 1802, at Besançon, where his father, then Major Hugo, was stationed in command of a brigade. His father having entered the service of Joseph Bonaparte, king of Italy, and afterwards of Spain, Victor's earlier years were partly spent in those countries, but in 1812 he went with his mother to Paris. At the age of twelve he was already writing verses, and in 1823 his first novel, Han d'Islande, appeared, followed in 1825 by Bug Jargal. In 1828 a complete edition of his Odes et Ballades appeared. In these productions Hugo's anti-classical tendencies in style and treatment of his subject had been very visible, but the appearance of his drama Cromwell (1827), with its celebrated preface, gave the watchword to the anti-classical or romantic school. Cromwell was too long for representation, and it was only in 1830 that Hernani, over which the great contest between Classicists and Romanticists took place, was brought on the stage. Other dramas followed—Marion Delorme (1831), Le Roi s'amuse (1832), Lucrèce Borgia (1833), Marie Tudor (1833), Angelo (1835), Ruy Blas (1838), Les Bourgraves (1843). During those years he had also published a novel, Notre Dame de Paris (1830), and several volumes of poetry, Les Feuilles d'Automne (1831), Les Chants du Crépuscule (1835), Les Voix Intérieures (1837), Les Rayons et Les Ombres (1840). The poetry of this period has



Victor Hugo.

a melody and grace superior perhaps to any that he afterwards wrote, but wants that deep and original sense of life which is characteristic of his later poems. During the same period he also wrote his critical essays on Mirabeau, Voltaire, and a number of articles for the Revue de Paris. In 1841, after having been twice previously rejected, he was elected a member of the French Academy; made shortly afterwards a tour in the Rhineland, of which he wrote a brilliant and interesting account in Le Rhin, published in 1842. In 1845 he was made a peer of France by Louis Philippe. The revolution of 1848 threw Hugo into the thick of the political struggle. At first his votes were decidedly Conservative, but afterwards, whether from suspicion of Napoleon's designs or from other reasons, he became one of the chiefs of the democratic party. After the *coup d'état*, December 2, 1851, he was one of those who kept up the struggle in the streets against Napoleon to the last. He then fled to Brussels, where he published the first of his bitter satires on the founder of the Second Empire, Napoléon le Petit. In the following year (1853) the second, the famous volume of Les Châtiments, a wonderful mixture of satirical invective, lyrical passion and pathos appeared. Hugo now went to live in Jersey, was expelled along with

the other French exiles in 1855 by the English government, and finally settled in Guernsey. It was in the comparative solitude and quietness of the Channel Islands that he wrote most of the great works of his later years, Les Contemplations (1856), La Légende des Siècles, 1st series (1859), Chansons des Rues et des Bois (1865), and his celebrated series of social novels, Les Misérables (1862), Les Travailleurs de la Mer (1866), and L'Homme qui Rit (1869). In 1870, after the fall of the Empire, Victor Hugo returned to Paris, where he spent the remaining years of a remarkably vigorous old age in occasional attendances at the senate, and in adding to the already long list of his literary works. Amongst these latest productions we may mention Quatre-vingt-treize (1872), L'Art d'être Grand-père (1877), L'Histoire d'un Crime (1877), Le Pape (1878), La Pitie Suprême (1879), Religions et Religion (1880), Les Quatre Vents de l'Esprit (1881), La Légende des Siècles (last series 1883), Torquemada (1882). He died on May 2, 1885.

Huguenots (hū'ge-nots), a term of unknown origin, applied by the Roman Catholics to the Protestants of France during the religious struggles of the 16th and 17th centuries. During the early part of the 16th century the doctrines of Calvin, notwithstanding the opposition of Francis I., spread widely in France. Under his successor Henry II., 1547–59, the Protestant party grew strong, and under Francis II. became a political force headed by the Bourbon family, especially the King of Navarre and the Prince of Condé. At the head of the Catholic party stood the Guises, and through their influence with the weak, young king, a fanatical persecution of the Huguenots commenced. The result was that a Huguenot conspiracy, headed by Prince Louis of Condé, was formed for the purpose of compelling the king to dismiss the Guises and accept the Prince of Condé as regent of the realm. But the plot was betrayed, and many of the Huguenots were executed or imprisoned. In 1560 Francis died, and during the minority of the next king, Charles IX., it was the policy of the queen mother, Catharine de Medici, to encourage the Protestants in the free exercise of their religion in order to curb the Guises. But in 1562 an attack on a Protestant meeting made by the followers of the Duke of Guise commenced a series of religious wars which desolated France almost to the end of the century. Catharine, however, began to fear that Protestantism might become a permanent power in the country, and suddenly making an alliance with the Guises between them they projected and carried out the massacre of St. Bartholomew's (August 25, 1572). The Protestants fled to their fortified towns and carried on a war with varying success. On the death of Charles IX., Henry III., a feeble sovereign, found himself compelled to unite with the King of Navarre, head of the house of Bourbon and heir-apparent of the French crown, against the ambitious Guises, who openly aimed at the throne, and had excited the people against him to such a degree that he was on the point of losing the crown. After the assassination of Henry III. the King of Navarre was obliged to maintain a severe struggle for the vacant throne; and not until he had, by the advice of Sully, embraced the Catholic religion (1593), did he enjoy quiet possession of the kingdom as Henry IV. Five years afterwards he secured to the Huguenots their civil rights by the Edict of Nantes, which confirmed to them the free exercise of their religion, and gave them equal claims with the Catholics to all offices and dignities. They were also left in possession of the fortresses which had been ceded to them for their security. This edict afforded them the means of forming a kind of republic within the kingdom, which Richelieu, who regarded it as a serious obstacle to the growth of the royal power, resolved to crush. The war raged from 1624 to 1629, when Rochelle, after an obstinate defence, fell before the royal troops; the Huguenots had to surrender all their strongholds, although they were still allowed freedom of conscience under the ministries of Richelieu and Mazarin. But when Louis XIV. and Madame de Maintenon set the fashion of devoutness, a new persecution of the Protestants commenced. They were deprived of their civil rights, and bodies of dragoons were sent into the southern provinces to compel the Protestant inhabitants to abjure their faith. The Edict of Nantes was revoked in 1685, and by this act more than 500,000 Protestant subjects were driven out to carry their industry, wealth, and skill to other countries. In the reign of Louis XV. a new edict was issued repressive of Protestantism, but so many voices were raised in favour of toleration that it had to be revoked. The revolution first put the Protestants on an equality with their Catholic neighbours.

Huia-bird, the native name of a genus of New Zealand starlings, *Heteralocha acutirostris* or *Neomorpha Gouldii*, comprising a single species of birds, occupying a very limited space in a few densely-wooded mountain ranges. The plumage is a very dark green, appearing to be black in some lights, the tip of the tail white. The most striking peculiarity about this bird is that the male has a stout, straight beak; the female a long, slender, curved bill.

Hulk, the name applied to old ships laid by as unfit for further sea-going service, and used as depots for coals, sailors, &c. The hulks formerly often heard of in England consisted of old ships to which convicts were sent previously to their transportation.

Hull, or KINGSTON-ON-HULL, a river port, municipal and parliamentary borough of England, and a county of itself, locally situated in the East Riding of York at the influx of the Hull into the estuary of the Humber. The town stands on a low and level tract of ground, and stretches along the banks of the Humber, from the inundations of which it is secured by strong embankments. Amongst the notable public buildings and institutions are the town-hall, the new exchange, the corn exchange, dock offices, &c., the royal institution, the public rooms, Hull and East Riding College, Reckitt free library, the infirmary, dispensary, children's hospital, &c. There are three well-laid-out public parks. The industries of the town are varied, comprising flax and cotton mills, ship-building, rope and sail works, iron-foundries, machine-making, seed-crushing, colour-making, oil-boiling, &c.; but its importance arises chiefly from its shipping commerce, Hull being one of the busiest seaports in the kingdom. The docks are amongst the largest in the kingdom. The railway communications are excellent, not fewer than five railway companies running into the town. It is an ancient town, and was of some importance long before it received its charter from Edward I. It played a conspicuous part during the civil war, being held by the Parliamentary forces, and twice besieged without success. It has three parliamentary divisions, East, Central, and West, each of which returns one member. Pop. (1891), 199,991.

Hullah, JOHN PYKE, an English musician, born in 1813, died in 1884. He entered the Royal Academy of Music in 1832, and attracted some attention by his comic opera, The Village Coquettes (1836), which was followed by the Barber of Bassora in 1837, and The Outpost in 1838. About this time he began to work for the establishment of popular singing-schools. He became professor of music at King's College and other institutions in London, and in 1874 inspector of training schools. He wrote some educational and historical works on music, amongst which are the Grammar of Harmony, Grammar of Counterpoint, A History of Modern Music, &c.

Hulse'an Lectures, a series of discourses delivered annually at Cambridge, under a bequest by the Rev. John Hulse, who died in 1789. The lectures must not be less than four or more than six. The subject prescribed is the evidences of revealed religion, or the explanation of the most difficult texts or obscure parts of Holy Scripture. The persons eligible as lecturers are Masters of Arts of the University of Cambridge.

Hu'manists, a party which, during the Renaissance of the sixteenth century, cultivated literature, especially classical literature. Their influence was decidedly in favour of progress and reform, and in this way they may be considered as heralding and co-operating with the great religious reformers. Erasmus is the great type of the humanist, as Luther is of the religious reformer.

Humanita'rians, a term sometimes applied to the various classes of anti-Trinitarians, who regard Christ as a mere man. Their opinions must not be confounded with Arianism, which admits the pre-existence of Christ, and his pre-eminence among God's creatures. The term is also applied to the followers of St. Simon, who maintained the perfectibility of human nature without the aid of supernatural grace.

Human'ities (Latin, *literæ humaniores*), a term for humane or polite literature, including the study of the ancient classics, in opposition to philosophy and science. In the Scotch universities *humanity* is applied to the study of the Latin language and literature alone.

Humber, a large river, or rather estuary, on the east side of England, between the counties of York and Lincoln. At its western extremity it is joined by the Ouse, after the latter has been augmented by the Derwent and Aire; below Goole it receives the Don, lower down the Trent, and still lower the Hull from the opposite side. It is about 35 miles long, and varies in breadth from 1 to 7 miles. There is at all times a considerable depth of water in the fair way

of the channel, and the navigation is safe and easy.

Humbert I., UMBERTO, King of Italy, born March 14, 1844, eldest son of Victor Emmanuel. In the war of 1866, in which Italy joined Prussia against Austria, he took the field in command of a division, and distinguished himself by his bravery in the disastrous battle of Custozza. In 1868 he married his cousin, Margherita, daughter of Duke Ferdinand of Genoa. He succeeded his father on January 9, 1878.

Humble-bee. See *Bee*.

Humble-plant, a species of sensitive plant (which see).

Humboldt (hum'bolt), FRIEDRICH HEINRICH ALEXANDER, BARON VON, a German traveller and naturalist, was born Sept. 14, 1769, at Berlin, where his father held the post of royal chamberlain. He studied at the Universities of Frankfort-on-the-Oder, Berlin, and Göttingen, and also at the commercial academy in Hamburg. His first work was Observations on the Basalt of the Rhine (1790). In 1791 he studied mining and botany at the mining school in Freiberg, and subsequently became overseer of the mines in Franconia. In 1797 he resolved to make a scientific journey in the tropical zones along with a friend, Aimé Bonpland. They landed at Cumana, in South America, in July, 1799, and spent five years in exploring scientifically the region of the Orinoco and the upper part of the Rio Negro, the district between Quito and Lima, the city of Mexico and the surrounding country, and the island of Cuba. In 1804 they arrived at Bordeaux, bringing with them an immense mass of fresh knowledge in geography, geology, climatology, meteorology, botany, zoology, and every branch of natural science, as well as in ethnology and political statistics. Humboldt selected Paris as his residence, no other city offering so many aids to scientific study, and remained there arranging his collections and manuscripts till March, 1805, after which he visited Rome and Naples in company with Gay-Lussac, but eventually returned to Paris in 1807, when the first volume of his great work, Voyage aux Régions équinoxiales du Nouveau Continent, appeared; the thirtieth and last was published in 1827. In 1827 Humboldt, who had been offered several high posts by the government of Prussia, and had accompanied the king on several journeys as part of his suite, was persuaded to give up his residence at Paris and settle at Berlin, where he combined the study of science with a certain amount of diplomatic work. In 1829, under the patronage of the Czar Nicholas, he made an expedition to Siberia and Central Asia, which resulted in some valuable discoveries, published in his Asie Centrale. In 1835 he published at Paris his Examen Critique de la Géographie du Nouveau Continent. In 1845 appeared the first volume of the Cosmos, his chief work, a vast and comprehensive survey of natural phenomena, in which the idea of the unity of the forces which move below the variety of nature is thoroughly grasped. Humboldt died in 1859.

Humboldt, KARL WILHELM, BARON VON, brother of the preceding, was born at Potsdam in 1767, and studied at Berlin, at Frankfort-on-the-Oder, and at Göttingen. After travelling in France and Spain, and acting as Prussian minister at Rome, he was called to fill the office of minister of the interior in connection with ecclesiastical and educational matters, and had a most important share in the educational progress which Prussia has since made. In 1810 he became minister plenipotentiary to Vienna took an active part in the conclusion of the Peace of Paris (1814), and at the Congress of Vienna (1815), and other great diplomatic transactions. In 1819 he was an active member of the Prussian ministry, but resigned and retired to his estate at Tegel, where he died in 1835. His works include poems, literary essays, &c., but by far the most valuable are his philological writings, such as Additions and Corrections to Adelung's Mithridates; Researches Regarding the Original Inhabitants of Spain in Connection with the Basque Language; on the Kawi Language of Java; on the Diversity of Language and its Influence on the Development of Speech; &c.

Hume, DAVID, an eminent historian and philosopher, was born at Edinburgh on the 26th April, 1711. He was destined for the law, but was drawn away by his love of literature and philosophy; and retired to France, where during three years of quiet and studious life he composed his Treatise upon Human Nature. The work was published at London in 1738, but, in his own words, 'fell dead-born from the press.' His next work, Essays, Moral, Political, and Literary (Edinburgh, 1742), met with a better reception. In 1745 he became companion to the insane Marquis of Annandale; and he accompanied General Sinclair in

1746 and 1747 in his expedition against France and in a military embassy to Vienna and Turin. He now published a recasting of his Treatise upon Human Nature, under the title of an Inquiry Concerning the Human Understanding (1747). In 1752 he published



David Hume.

his Political Discourses, which were well received, and his Inquiry Concerning the Principles of Morals. The same year he obtained the appointment of librarian of the Advocates' Library at Edinburgh, and began to write his history of England, of which the first volume appeared in 1754. It was, like most of the succeeding volumes, severely attacked both for its religious and political tendencies; but, in spite of adverse criticism, his History of England, after its completion in 1761, was recognized as a standard work. Its merits are chiefly clearness and force of narrative and philosophical breadth of view in the judgment of men and events. In 1763 he accepted an invitation from the Earl of Hertford, then proceeding as ambassador to Paris, to accompany him, and was enthusiastically received by Parisian circles in his character of philosopher and historian. After the departure of Lord Hertford in 1756, he remained as *chargé d'affaires*, and returned to England in 1766, bringing with him Rousseau, for whom he procured a pension and a retreat in Derbyshire. But the morbid sensitivity of Rousseau brought about a disagreement which put an end to the friendship. In 1767 he was appointed under-secretary of state, a post which he held till 1769, when he retired to Edinburgh. Here he lived till his death on August 25, 1776. As a philosopher, in which quality his reputation is perhaps greatest, Hume's acute sceptical intellect did great service by directing research to the precise character of the fundamental conceptions on which our knowledge and our beliefs are based. His acute negative criticism of these conceptions (*e.g.* his reduction of the ideas of personal identity, conscience, causality, to mere effects of association) compelled philosophy either to come to a dead halt or to find, as Kant did, a new and profounder view of the nature of human reason.

Hume, Joseph, politician and economist, born at Montrose in 1777. After studying medicine at Edinburgh he was appointed marine assistant-surgeon in the service of the East India Company. Having qualified himself by a diligent study of the native languages he obtained several lucrative posts connected with the commissariat and the pay-office, and in 1808, when only in his thirty-first year, he was able to return to Europe with a considerable fortune. After making a tour in Southern Europe and Egypt he became in 1812 Tory member for the 'rotten borough' of Weymouth; but losing his seat in 1813 began to take an active part in regard to Lancasterian schools, savings'-banks, and other measures of social reform. In 1818 he was again returned to parliament as member for the Aberdeen district of burghs. It was now that he began his career as an active advocate of reforms, such as the emancipation of the Catholics, the repeal of the Test and Corporation Acts, economy in public expenditure, &c. He had no power as an orator, his strength lying in his handling of figures and the tenacity and energy with which he carried on his crusade against corruption. After representing Middlesex and Kilkenny county he was returned by the Montrose burghs in 1842, which he continued to represent till his death in 1855.

Humerus, the long cylindrical bone of the arm, situated between the shoulder and the fore-arm; also the corresponding bone in the lower animals.

Humming-birds, the name given to a family (Trochilidæ) of minute and beautiful birds, so called from the sound of their wings in flight. The beak is slender, generally long, sometimes straight and sometimes curved; the tongue is long, filiform, bifid at the point, and capable of being protruded to a con-

siderable distance. In size humming-birds vary from that of a wren to that of a humble-bee. They never light to take food, but feed while on the wing, hovering before a flower, supported by a rapid vibratory movement of the wings which produces the humming noise. Insects form a great proportion of their food. These beautiful birds are peculiar to America, and almost exclusively tropical. One species, the ruby-throated humming-bird (*Trochilus colubris*), is pretty common in the north-east of the United States. The only note of the humming-bird is a single chirp, not louder than that of a cricket. It is very fearless and irascible, two males scarcely ever meeting without a contest. Among the more remarkable of these birds is the tufted-necked humming-bird (*Ornismya ornāta*) of Guiana and Northern Brazil. In this species the crest, outer tail-feathers, and neck-plumes are reddish chestnut, the latter tipped with green, the throat and upper part of the breast are emerald green, the back bronze green. Perhaps four hundred species of humming-birds are now known.



Tufted-necked Humming-bird
Ornismya ornāta.

Humus, a substance which occurs in vegetable mould, and in liquids containing decomposing vegetable matter. Humus as it exists in the soil is a product of the decay of vegetables. It is a mixture of various carbon compounds, which slowly undergo combustion with the production of carbon dioxide, water, and ammonia, which are again taken up by plants.

Hundred, in England, a division of a shire or county. It was so called, according to some writers, because each hundred found 100 sureties of the king's peace, or 100 able-bodied men of war. Others think it to have been so called because originally composed of 100 families. Hundreds are said to have been first introduced into England by Alfred. Formerly if a crime was committed, such as robbery, arson, killing or maiming cattle, destroying turnpikes or works on navigable rivers, the hundred had to make it good; but hundreds are now only liable for damage done by rioters acting feloniously.

Hungary (Hungarian name, *Magyar-Ország*, Land of the Magyars), a kingdom in the south-east of Europe, forming, together with Austria, the Austro-Hungarian monarchy. It includes Hungary Proper, with Transylvania, Slavonia, Croatia, the Croato-Slavonian Military Frontiers, &c.; total area, 124,400 sq. miles, with a pop. of 17,449,705. Hungary Proper (including Transylvania), with an area of 108,000 sq. miles and a pop. of 15,122,514, may be considered as a large basin surrounded by mountains on every side except the south. Of these the principal are the Carpathians, which cover the northern and eastern parts of the country with their ramifications. The Danube and the Theiss, with their affluents, are the chief rivers. The Poprad, in the north, is tributary to the Vistula, being the only Hungarian river not belonging to the basin of the Danube. The Drave forms the south-west frontier on the side of Croatia and Slavonia. Between the Danube and the Drave lie the two principal lakes, the Platten See or Balaton Lake and the Neusiedler See, from which the water occasionally disappears. Hungary is one of the healthiest countries in Europe, and generally has a fertile soil. All kinds of grain, especially excellent wheat, wines, fruits, tobacco, hemp, flax, hops, saffron, woad, madder, sumach, cotton, are among the products of Hungary. Horses, cattle, sheep, hogs, game (in the north bears), poultry, fish (especially the sturgeon and salmon), bees, and silk-worms are among the productions of the animal kingdom. Among the minerals are gold, silver, copper, iron, lead, zinc, cobalt, antimony, sulphur, arsenic, salt, &c., with coals and peat. The situation of Hungary, which occupies an area where the various races of Europe meet and interlace, accounts for the variety of nationalities it contains. These comprise, besides the Hungarians or Magyars (over 7,000,000 in number), Roumanians, Slovacks, Germans, Servians, Ruthenians, &c. The Magyars, who are the dominant race, are located for the most part compactly in the centre of the kingdom. They are brave, high-spirited, and sincere, in many respects resembling their kinsmen the Turks. A decided majority are Roman Catholics, the rest Protestants, chiefly Calvinists, with a few Greek Catholics. The Germans have settled all over the country, and there is scarcely a town of Hungary

which is not at least partly inhabited by Germans, while some are essentially German. Science, literature, the press, trade and industry, are for the greater part in their hands. The Hungarian has a natural inclination to agriculture and the breeding of cattle, and the fertility of the soil making up for some deficiencies in methods has made Hungary one of the chief corn-growing countries of Europe. It is also celebrated for its wines, the finest variety of which is the Tokay. There are few extensive manufactures in Hungary. Iron and steel works, potteries, glass manufactories, sugar-refineries, soap and tallow works, are amongst the principal. The production of coal and iron is increasing; and the annual value of the mining products is about £2,500,000. With regard to popular education Hungary is behind the Austrian part of the empire, but education was made compulsory in 1868. There are universities at Budapest, Klausenburg, and Agram. The Hungarian language is nearly allied to the Turkish and Finnish, but not to any other tongue spoken in Europe. It has latterly been carefully cultivated, and Hungarians have distinguished themselves in all branches of literature. Among modern names we can only mention those of Andrew Horváth, Eötvös, A. and C. Kisfaludy, Garay, Vörösmarty, Petöfi, Kerény, Arany, Josika, and Jokay. Besides its representation in the controlling body of Delegations (see *Austria*) Hungary since 1867 has an independent Diet, consisting of an Upper and Lower House, the first composed of hereditary and life peers, church dignitaries and state dignitaries; the second of representatives elected by vote. The Austrian emperor is only king of Hungary. Croatia and Slavonia have a common diet of their own for the management of internal affairs.

History.—The Magyars, an Asiatic people of Turanian race, allied to the Finns and the Turks, dwelt in what is now Southern Russia before they descended under Arpád into the plain of the Danube, towards the end of the 9th century, and conquered the whole of Hungary and Transylvania. During the first half of the 10th century their invasions and incursions spread terror throughout Germany, France, and Italy; but at length their total defeat by Otho I. of Germany put an end to their maraudings, and under their native dynasty of Arpáds they settled down to learn agriculture and the arts of peace. Stephen I. (997–1030) was the first who was successful in extending Christianity generally amongst the Hungarians, and was rewarded by a crown from Pope Sylvester II. and with the title of *apostolic king* (1000). Stephen encouraged learning and literature, and under him Latin became not only the official language of the government, but the vehicle of Hungarian civilization, which it unfortunately continued to be for the next 800 years. In 1089 King Ladislaus extended the boundaries of Hungary by the conquest of Croatia and Slavonia, and King Coloman by that of Dalmatia in 1102. During the 12th century the Hungarians first attained, through French connections, a certain refinement of life and manners. About the middle of the 13th century King Bela induced many Germans to settle in the country which had been depopulated by the Mongol invasions. With Andrew III. (1290–1301) the male line of the Arpád dynasty became extinct, and the royal dignity now became purely elective. Charles Robert of Anjou was the first elected (1309). Louis I. (1342–82) added Poland, Red Russia, Moldavia, and a part of Servia, to his kingdom. The reign of Sigismund (1387–1437), who was elected Emperor of Germany, is interesting from the invasion of Hungary by the Turks (1391), and the war with the Hussites. Sigismund introduced various reforms, and founded an academy at Buda. Matthias Corvinus (1458–90), combining the talents of a diplomatist and general, was equally successful against his enemies at home and abroad, and is even yet remembered by the popular mind as the ideal of a just and firm ruler. He founded a university at Pressburg. During the reigns of Ladislaus II. (1490–1516) and Louis II. (1516–26) the rapacity of the magnates and domestic troubles brought the power of Hungary low, and the battle of Mohacs (1526) made a great part of the country a Turkish province for 160 years. The rest was left in dispute between Ferdinand of Austria and John Zapolya; but eventually by the help of the Protestants passed to the former, and has since remained under the sceptre of the Hapsburgs. In 1686 Leopold I. took Buda and recovered most of Hungary and Transylvania. In 1724 Charles VI. secured by the Pragmatic Sanction the Hungarian crown to the female descendants of the house of Hapsburg, and the loyalty of the Hungarians to his daughter, Maria Theresa, saved the dynasty from ruin. Maria Theresa did much for the improvement of Hungary

by the promulgation of the rural code called Urbarium, and by the formation of village schools. On the advent of the French revolution, and during the wars which ensued, the Hungarians once more played a prominent part in support of the Hapsburg crown. Napoleon fell, but the revolution had given an impetus to ideas of national and popular rights which the Hungarians, long stifled under the Germanic traditions and tendencies of their rulers, were amongst the first to feel. For a time Francis I. and Metternich stood stiffly out against all concessions, and tried to govern by pure absolutism, but ended by summoning in 1825 a new diet. The diet distinguished itself by adopting the Magyar language in its debates instead of the Latin to which it had been accustomed. Succeeding diets in 1830 and 1832 made new demands in the direction of religious equality, a popular suffrage, and abrogation of the privileges of the nobles. The Austrian government attempted to repress the Hungarian national movement by imprisoning Deák, Kossuth, and others of the leaders. The struggle continued till 1848, when the French revolution of that year gave the impulse for a similar rising in Vienna. Prince Metternich fled to London, and the Viennese court made a formal concession of all important demands; but these had no sooner been granted than the government began secretly to work against their being put in operation. The dependencies of the Hungarian crown, the Croats and the Wallachians of Transylvania were privately encouraged to revolt, and in December of the same year an Austrian army took the field with the avowed object of annihilating the independence of Hungary; but a series of pitched battles resulted on the whole so much in favour of the Hungarians that Austria was obliged to call in the aid of Russia, which was at once granted. After a heroic struggle the Hungarians had to succumb. The nation was reduced to the position of a province, and some of the greatest statesmen and soldiers of Hungary perished on the scaffold. But the struggle was continued by the Hungarians in the form of a constitutional agitation, and at last, when the battle of Sadowa in 1866 separated Austria from Germany, Austria, left face to face with a nation almost as powerful and numerous as itself, felt compelled to submit. In 1867 a separate constitution and administration for Hungary was decreed, and on 8th June the emperor and empress were crowned king and queen of Hungary with the utmost pomp, according to the ancient ceremonies of a Hungarian coronation. The dualism of the Austrian empire was thus finally constituted. It was indeed but the partial recognition of the fact that the empire was a heterogeneous assemblage of communities differing widely in race, language, social habits and customs, and bound together only by the accident of having fallen to the house of Hapsburg.

Hungary-balsam, a kind of turpentine procured from *Pinus Pumilio*, the mountain-pine of Hungary.

Hungary-water, a distilled water consisting of dilute alcohol aromatized with the tops of flowers of rosemary or other aromatic substances, used as a perfume: so called because first made for the use of a queen of Hungary.

Hunger, a craving for food. It is a sensation partly arising in the stomach, since it may be relieved temporarily by the introduction into the stomach of material which is incapable of yielding any nutriment to the body. It may be due to a condition of fulness of the vessels of the stomach, relieved by any stimulus which, acting on the lining membrane, induces a flow of fluid from the glands. But it also arises from a condition of the system since the introduction of nutriment into the blood, apart altogether from the stomach, will relieve it. This is also evident from the fact that hunger may be experienced even when the stomach is full of food, and when food is supplied in abundance, if some disease prevents the absorption of the nourishment, or quickly drains it from the blood. Hunger may be partially allayed by sleep or by the use of narcotics, tobacco, and alcohol, all of which tend to diminish the disintegration of tissue.

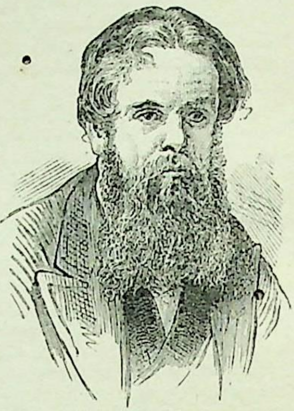
Huningen (hụ'ning-en), a town of Germany, in Upper Alsace, formerly fortified. It has a famous fish-breeding establishment. Pop. 1704.

Huns, a nomadic and warlike people of Asia, of Mongolian race, part of whom entered Europe, probably in the 4th century after Christ, conquered the Alans, and drove the Goths out of Dacia. They continued to extend their dominion along the Danube till the time of Attila (434 A.D.), who, uniting the whole Hunnish power in one hand became the most powerful prince of his time. (See *Attila.*) His defeat near Chalons was the commencement

of the decline of the power of the Huns, and within a generation after his death in 453, the great Hunnish empire had completely disappeared, and the race been absorbed amongst other barbarous peoples. The term Huns was used by ancient and mediæval writers in a very vague way to indicate barbarous hordes invading Europe from the north-east. The Huns are described as a race of dark complexion with small black eyes, flat noses, and broad shoulders.

Hunt, JAMES HENRY LEIGH, an English poet and essayist, born in 1784. He was educated at Christchurch Hospital, where he attained some distinction, entered the office of his brother, an attorney, and afterwards obtained a situation in the war office. In 1808, in conjunction with his brother John, he started the Examiner newspaper, which soon became prominent for the fearlessness with which public matters were discussed. Ere long official resentment took shape in two prosecutions of the brothers, the second of which, occasioned by an article in the paper of 22d March, 1812, reflecting on the character of the prince regent, resulted in the brothers being sentenced to pay a fine of £500 each, and to suffer two years' imprisonment. During his confinement he wrote several works, amongst which are the Feast of the Poets, the Descent of Liberty, and the Story of Rimini. In 1818 appeared Foliage, a collection of original poems and translations from Homer, Theocritus, Bion, &c.; and in 1819 the Indicator was started, a weekly journal on the model of the Spectator, which contained some of his best essays. In 1822 he proceeded to Italy, having received an invitation thither from Byron and Shelley, and, in conjunction with the former, carried on a newspaper called the Liberal; but it proved unsuccessful. On his return to England Hunt published Recollections of Lord Byron and some of his Contemporaries (two vols., 1828), which provoked somewhat the indignation of the noble poet's friends. Among his subsequent works may be mentioned, A legend of Florence, a play represented with some success at Covent Garden in 1840; Stories from the Italian Poets (two vols. 1846); Men, Women, and Books (1847); A Jar of Honey from Mount Hybla (1847); the Town, its Memorable Characters and Events (1848); Autobiography (three vols. 1850); Table Talk (1850). In 1842 Mrs. Shelley settled an annuity of £120 upon Leigh Hunt, and in 1847 a government pension of £200 a year was bestowed on him. He died in 1859.

Hunt, WILLIAM HOLMAN, an English painter, born in 1827 at London. He was trained in the Royal Academy school, and began to exhibit in 1846. He belongs to the so-called Pre-Raphaelite school of English artists.



W. Holman Hunt.

(See *Pre-Raphaelite School.*) In 1853 his Claudio and Isabella first attracted public attention, followed next year by the Light of the World (Christ teaching in the temple). Mr. Hunt then made a journey to the East, the fruits of which are observable in the local colouring and strength of realization in his succeeding pictures of Eastern life, amongst which we may mention The Scapegoat (1856); The Finding of the Saviour in the Temple (1860); Shadow of the Cross (1873); Plains of Esdraelon (1877); Triumph of the Innocents (1885). Outside of Biblical subjects Mr. Hunt has painted some notable pictures: Isabella and the Pot of Basil, The After-Glow, The Festival of St. Swithin, &c.

Hunter, JOHN, surgeon and physiologist, was born at Long Calderwood, Lanarkshire, in 1728. He assisted his brother-in-law, a carpenter in Glasgow, for some time in his trade, but afterwards went as assistant to his brother William, a prosperous surgeon in London. In 1756 he was appointed house-surgeon at St. George's Hospital, and also lectured in his brother's school of anatomy. In 1760, his health needing a change of climate, he became staff-surgeon and went with the army to Portugal. Three years

afterwards he returned to London, and, in 1768, was appointed surgeon to St. George's Hospital; in 1790 surgeon-general to the army, and inspector-general of hospitals. He died in 1793. Hunter contributed greatly to the high development of English surgery, as well as to the advance of anatomy and physiology. One of his chief works was on the Blood, Inflammation, and Gun-shot Wounds (1794). His valuable museum of surgical and anatomical subjects was purchased by the government and presented to the Royal College of Surgeons.

Hunter, William, M.D., physician and anatomist, elder brother of the preceding, was born at Long Calderwood, Lanarkshire, in 1718; studied at Glasgow with a view to entering the church, but abandoned theology for medicine. In 1741 he went to London, where he became a member of the College of Surgeons; acquired a large practice in surgery and midwifery; was appointed accoucheur to the British Lying-in Hospital, and in 1764 physician-extraordinary to the queen; in 1767 a fellow of the Royal Society; in 1780 foreign associate of the Royal Medical Society at Paris, &c. In 1770 he established a theatre of anatomy for his own lectures and a splendid museum for his anatomical preparations, objects of natural history, pictures of ancient coins and medals, &c. He was the author of some important works, in particular the Anatomy of the Human Gravid Uterus, published in 1774. He died in 1783, bequeathing the whole of his splendid museum, valued at £150,000, to the University of Glasgow, with the sum of £8000 in cash to be expended in a building for its reception, and a further sum of £500 per annum to bear the charges of its preservation.

Hunting. See *Fox-hunting.*

Huntingdon (contracted *Hunts*), a small inland county of England, surrounded by the counties of Northampton, Cambridge, and Bedford; area, 229,515 acres. The north-eastern portion is included within the great fen district and is principally devoted to grazing. The soil is clayey and has of late been much improved in productiveness by scientific farming. Five-sixths of the total area is under crops and permanent pasture. Cattle-rearing, market-gardening, and in the fen portion the cultivation of willows are amongst the principal employments. The manufactures are unimportant. Politically the county is divided into two parts, Northern and Southern, each of which returns a member. Pop. 57,772.—The county town, Huntingdon, 59 miles north by west of London on the north bank of the Ouse, has breweries, brick-works, carriage works, &c., as well as large nurseries in the neighbourhood. Oliver Cromwell was born and went to school here. Pop. 4349.

Huntingdon, Selina, Countess of, was born in 1707, and married in 1728, to the Earl of Huntingdon. She became a widow in 1746, and, adopting the principles of the Methodists, was long considered, owing to her rank and fortune, as the head of the Calvinistic Methodists. She founded a college at Trevecca in Wales, for the education of ministers, built numerous chapels, and contributed liberally to the support of the clergy. She died June 17, 1791.

Huntly, a town of Scotland in Aberdeenshire, 41 miles N.W. of Aberdeen. Pop. 3760.

Huon Pine (*Dacrydium Franklinii*), a pine, or, rather, yew, growing in Tasmania, and yielding a useful timber.

Hu-peh, a province of Central China. See *Hou-pe.*

Hura, a genus of tropical American plants, nat. order Euphorbiaceæ. *H. crepitans*, the sand-box tree, is remarkable for the loud report with which its seed-vessel bursts. It is a large branching tree with glossy poplar-like leaves, inconspicuous diœcious flowers, and large, furrowed, roundish fruits of the size of an orange.



Sand-box Tree (*Hura crepitans*).

Hurdles, frames formed of perpendicular stakes with horizontal bars, and braced with diagonal pieces for the purpose of forming temporary fences. In fortification the name is given to a collection of twigs or sticks closely interwoven and sustained by long stakes, and serving to render works firm, or to cover traverses and lodgements for the defence of workmen against fireworks or stones.

Hurdwar. See *Hardwar.*

Hurdy-gurdy, a stringed instrument, played by turning a handle. Its tones are produced by the friction of a wheel acting

the part of a bow against four strings, two of which are pressed by the fingers or by keys. The other two strings are tuned a fifth apart to produce a drone bass, and are not stopped by the fingers or keys.



Hurdy-gurdy.

Huron, Lake, one of the five great lakes on the frontiers of the United States and Canada. It is the third in size, being 218 miles long north and south, and (including Georgian Bay) 180 miles broad at its widest part, with an area of about 21,000 miles. It lies 578 feet above sea-level. The lake contains several thousand islands, varying in size from a few square feet to huge islands like the Great Manitoulin, which is about 107 miles long and from 4 to 25 miles wide, and is the only one inhabited. The waters are very clear and pure, abound in fish, and have a depth averaging from 800 to 1000 feet.

Huronian-rocks, in geology, a term applied to certain rocks on the banks of Lake Huron, consisting of quartzite, with masses of chloritic schist. They occupy the same relative position as the upper parts of the Archæan rocks of Britain.

Hurons. See *Wyandots*.

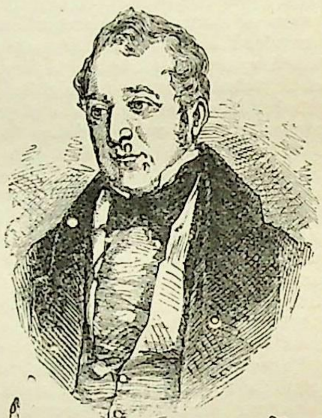
Hus (hös), John. See *Huss*.

Husband and Wife. Recent legislation in most countries has been in the direction of putting husband and wife on an equality, whereas formerly the wife to a great extent lost her separate status on marriage. Thus, for instance, by the English common law her personal property passed at once to her husband on marriage, though this might be obviated by special settlements, &c. But the law no longer stands so, especially since the act of 1882. By this statute a married woman can acquire, hold, and dispose by will or otherwise, of property as if she were an unmarried woman, and may enter into any contract, and sue or be sued without the participation of her husband. A woman carrying on a business separately from her husband is subject to the bankruptcy laws as if she were unmarried. Every married woman has, even against her husband, the same civil remedies, and also the same remedies by way of criminal proceedings for the protection and security of her own property as if she were unmarried; but she cannot take criminal proceedings against her husband while they are living together. Generally a husband is not bound by the contracts of his wife unless they are made by his express or implied authority. See also *Marriage*, *Divorce*, *Adultery*, &c.

Husch (hosh), a town of Roumania, on the Pruth, seat of a Greek bishop. Pop. 18,500.

Hushiarpur. See *Hoshiarpur*.

Hus'kisson, William, English statesman, born in 1770. In 1790 he was appointed secretary to Lord Gower, the British ambassador at Paris, and in 1795 became under-secretary for war and the colonies. In 1796 he became member of parliament for Morpeth, and in 1804 secretary of the treasury in the Pitt administration. In 1814 he was appointed chief commissioner of woods and forests; he was returned for Liverpool in 1823, and made president of the board of trade. In 1827 he became secretary of



William Huskisson.

state for the colonies, under Lord Goderich. He had now come to be a recognized authority on all questions of trade and commerce. In 1828 a misunderstanding with the Duke of Wellington, then at the head of the cabinet, led to his withdrawing, along with other Tories, from the administration. He was accidentally killed at the opening of the Liverpool and Manchester Railway, 15th September, 1830.

Huso (*Acipenser huso*), the great or white sturgeon. See *Sturgeon.*

Huss, or Hus, John, Bohemian religious reformer, born about 1373. He studied at the University of Prague, took the degree of Master of Arts in 1396, and in 1398 began to lecture on theology and philosophy. In 1401 he was made dean of the faculty of philosophy, became the leader of the Bohemian in opposition to the German professors and academicians, and after the withdrawal of the latter to Leipzig, was made rector of the university (1409). Since 391 he had been acquainted with the writings of Wickliffe, and his denunciation of the papal indulgences, of masses for the dead, of auricular confession, &c., alarmed Archbishop Sbynko of Prague, who had 200 volumes of Wickliffe's writings burned (1410) in the archiepiscopal palace, and the preaching in Bohemian prohibited. Huss appealed to the pope, John XXIII., who summoned him to appear at Rome. Huss refused to appear, and was in consequence excommunicated, and Prague laid under an interdict as long as Huss should remain in it. The people of Prague, however, stood by their preacher, and the pope was compelled to acquiesce. But the quarrel broke out again when Huss and his friend Jerome publicly condemned the papal indulgences granted for the crusade against Ladislaus of Naples. Huss was again excommunicated and Prague interdicted. The reformer now retired to Hussinatz to the protection of his feudal lord, and here he wrote his books On the Six Errors and On the Church, in which he attacks transubstantiation, the belief in the pope and the saints, the efficacy of the absolution of a vicious priest, unconditional obedience to earthly rulers, and simony, which was then extremely prevalent, and makes the Scriptures the only rule of matters of religion. The approbation with which these doctrines were received, both among the nobility and common people, increased the party of Huss in a great degree, and emboldened him to comply with the summons of the Council of Constance to defend his opinions before it. The Emperor Sigismund, by letters of safe conduct, became responsible for his personal safety; and John XXIII., after his arrival at Constance, November 4, made promises to the same effect. Notwithstanding this, he was thrown into prison, November 28, and after several public examinations, conducted with little regard to justice and the rights of the accused, he was sentenced to death on July 6, 1415, and burned alive the same day, and his ashes thrown into the Rhine. See also *Hussites.*

Hussars', originally the name of the Hungarian cavalry, raised by Matthias I. in 1458. Every twenty houses were obliged to furnish a man, and thus from the Hungarian word *husz* (twenty) was formed the name *Huszar*, *Hussar*, afterwards applied generally to light cavalry, similarly dressed and armed, of other European armies.

Hussites, the followers of John Huss. After the death of Huss, his adherents took up arms for the defence of their principles, and under the leadership of Johann Ziska, captured Prague, fortified Mount Tabor, and repeatedly defeated the troops sent against them by the Emperor Sigismund, who had succeeded to the crown of Bohemia. Ziska died in 1424, and was succeeded by Procopius, who also distinguished himself by many victories. The excesses of this party, however, who were called the *Taborites*, alienated the moderate Hussites, who called themselves *Calixtines*, and who finally united with the Catholics by the Compact of Prague in 1433 to acknowledge Sigismund as king, certain concessions, especially the use of the cup for the laity, having been made to them by the Council of Basel. The Taborites thus weakened were totally defeated at Bömischbrod on 31st May, 1434, and afterwards declined as a political party, finally becoming merged in the Bohemian Brethren. See *Bohemia*, *Bohemian Brethren.*

Hustings, (1) a name given to a court formerly held in many cities of England, as York, Winchester, Lincoln, but especially applied to the county court of the city of London held before the lord-mayor, recorder, and sheriffs. (2) The platform from which candidates for seats in parliament addressed the constituency on their nomination previous to the Ballot Act of 1872.

Husum (hö'zum), a seaport of Prussia in Schleswig-Holstein, with a good trade. Pop. 6267.

Hutch'eson, Francis, LL.D., philosophical writer, born in Ireland in 1694. He studied at the University of Glasgow from 1710 to 1716, was licensed to preach, but set up a private academy in Dublin. In 1725 his celebrated Inquiry into the Ideas of Beauty and Virtue appeared, followed in 1728 by his Treatise on the Passions. In 1729 he was called to the chair of moral philosophy at Glasgow. The main features

of his philosophical teaching are the theory of a distinct moral sense or conscience peculiar to man, and his view of virtue as benevolence. Hutcheson's moral philosophy is strongly opposed to the empiricism of Locke, and in this respect he may be considered as the precursor of Reid and the Scottish school. He died in 1746. In 1755 a System of Moral Philosophy was published from his MSS.

Hutch'inson, John, an English officer of the parliament, and governor of Nottingham Castle during the great civil war, was born at Nottingham in 1616, studied at Cambridge, and afterwards went to London to study law. In 1638 he married Lucy, the daughter of Sir Allan Apsley. On the outbreak of the civil war he joined the popular party, and was appointed governor of Nottingham Castle, which he defended against the royalists with great skill and gallantry. On the termination of the war he was returned to parliament for his native town, and was a member of the high court of justiciary which condemned the king to death, but subsequently retired from public life, because he disapproved of Cromwell's arbitrary conduct as ruler. After the Restoration Colonel Hutchinson was arrested and died in prison in 1664. His wife wrote a memoir of his life which is amongst the valuable and interesting of its kind in English literature.

Hutten, Ulrich von, a German knight, distinguished for the influence which his writings exercised upon the Reformation, was born at the family castle of Steckelberg on the Main, in 1488, and educated at the famous monastic school of Fulda. He led a wandering and unsettled life, sometimes appearing as the man of letters and controversialist, at other times as the soldier. His first attacks on the Roman Church were in connection with his defence of the persecuted Reuchlin, and with the issuing of the Epistolæ Obscurorum Virorum (which see). In 1517 he was crowned laureate at Augsburg, and knighted by the emperor. A year or two after he retired to his paternal castle to write work after work, addressing the people, like Luther, in their native German, and denouncing the arrogance and corruption of Rome. The Roman authorities at length began to move against him, and he fled to the castle of his friend Franz von Sickingen, and from that again to Switzerland, where he died in 1523.

Hutton, Charles, LL.D., an English mathematician, born in 1737. He was first a teacher of mathematics at Newcastle, but having published in 1772 a small work on the Principles of Bridges, which attracted attention, he was next year appointed professor of mathematics at Woolwich College. In 1785 he published his Mathematical Tables, followed not long after by his Tracts, Mathematical and Philosophical, and Elements of Conic Sections. His Mathematical and Philosophical Dictionary appeared in 1795-96; his Course of Mathematics in 1798, with an additional volume in 1811. In 1812 he published another collection of Tracts on mathematical and philosophical subjects. He died in 1823.

Hutton, James, Scottish geologist, born at Edinburgh in 1726. He studied at the university there and at Leyden, where he graduated as M.D. in 1749. Returning to Scotland he settled for a time on a farm of his own in Berwickshire, but about 1768 went to Edinburgh, and devoted himself to scientific researches. His name is especially connected with a geological system, the chief features of which are his recognition of the similarity of processes in the past and present, and his theory of igneous fusion as accounting for most geological phenomena. Among his numerous works are an Investigation of the Principles of Knowledge, Theory of Rain, Theory of the Earth, with Proofs and Illustrations (1795). He died in 1797.

Huxley, Thomas Henry, English naturalist, born May 4, 1825. He graduated M.B. at the University of London in 1845, and entered the royal navy as assistant-surgeon in 1846. He sailed with H.M.S. Rattlesnake on a surveying expedition to Australasia, during which he sent a number of valuable papers to the Royal Society. After being professor of natural history in the School of Mines, Fullerian professor of physiology to the Royal Institution, Hunterian professor in the Royal College of Surgeons, president of the British Association meeting held at Liverpool in 1870, lord-rector of Aberdeen University in 1872, secretary of the Royal Society, substitute professor of natural history for Professor Wyville Thompson at Edinburgh in 1875 and 1876, a member of various royal commissions on fisheries, vivisection, universities, &c., and inspector of salmon fisheries, he resigned this and almost all his other offices in 1885 on account of ill health. Amongst his works are The Oceanic Hydrozoa (1857), On the Theory of the Vertebrate Skull, Man's Place in Nature

(1863), On our Knowledge of the Causes of the Phenomena of Organic Nature, a series of lectures to working-men delivered in 1862, Elements of Comparative Anatomy (1864), Elementary Physiology (1866), Introduction to the Classification of Animals (1869),



Thomas Henry Huxley.

Lay Sermons, Addresses, and Reviews (1870), Critiques and Addresses (1873), American Addresses (1877), Physiography (1877), Anatomy of Invertebrate Animals (1877), The Crayfish (1879), Science and Culture (1882), &c. He died at Eastbourne, June 29, 1895.

Huy (wē), a town of Belgium, province of and 18 miles south-west of Liége. It has a strongly-fortified citadel. Pop. 13,114.

Huygens (hoi′gens), CHRISTIAN, Dutch mathematician and physicist, born in 1629. He studied at Leyden, and at Breda, where he went through a course of civil law from 1646–48. He made several journeys to Denmark, France, and England; in 1666 settled at the invitation of Colbert in Paris, where he remained till 1681, when he returned to Holland on account of his health. He died at the Hague in 1695. Among his most important contributions to science are his investigations on the oscillations of the pendulum, and his System of Saturn, in which he first proved that the ring completely surrounds the planet, and determined the inclination of its plane to that of the ecliptic. In 1690 he published important treatises on light and on weight. His Traité de la Lumière was founded on the undulation theory, but in consequence of the prevalence of the Newtonian theory it was long neglected till later researches established its credit.

Huysum (hoi′sum), JAN VAN, distinguished Dutch flower and fruit painter, born at Amsterdam in 1682. He worked at first with his father Justus Huysum, a picture-dealer and painter, but afterwards set up on his own account, devoting himself to the painting of fruit and flowers, in which he reached the highest perfection, surpassing all his predecessors in softness and delicacy of colour, fineness of pencilling, and exquisite finish. He was extremely jealous of rivalry, and kept his methods of working, preparation of colours, &c., a deep secret. He died at Amsterdam 1749. His brother Justus was a battle painter, and died at the age of twenty-two years. Another brother, Jakob, copied his brother's flower and fruit pieces so perfectly that they have been mistaken for that master's work. He died in England in 1740.

Hwang-ho. See *Hoang-ho.*

Hy′acinth, a genus of liliaceous bulbous plants, including about thirty species, amongst which the garden hyacinth (*Hyacinthus orientālis*) is celebrated for the immense varieties which culture has produced from it. It is a native of the Levant, and was first cultivated as a garden flower by the Dutch about the beginning of the 16th century.

Hy′acinth, or JACINTH, a variety of the mineral zircon, whose crystals, when distinct, have the form of a four-sided prism, terminated by four rhombic planes, which stand on the lateral edges. Its prevailing colour is a red, more or less tinged with yellow or brown. The name hyacinth is also given to varieties of the garnet or cinnamon stone, the sapphire, and topaz.

Hy′ades, a cluster of five stars in the constellation Taurus, supposed by the ancients to indicate the approach of rainy weather when they rose with the sun.

Hyæna. See *Hyena.*

Hya-hya (*Tabernæmontana utilis*), a milky plant of South America. See *Cow-trees.*

Hy′alite, a pellucid variety of opal, resembling colourless gum or resin.

Hybernation. See *Dormant State.*

Hybla, a mountain in Sicily, where thyme and odoriferous flowers of all sorts grow in abundance. It was famous in ancient times for its honey.

Hybrid, the produce of a female animal or plant which has been impregnated by a male

of a different but nearly allied species or genus. Much uncertainty prevails respecting the productive crossing of species, but it seems to be established that while the crossing of different genera may result in offspring, that of different orders will not. Hybrids are obtained amongst fishes from different species of carp; amongst birds, from the goldfinch and canary, the swan and the goose, &c.; amongst mammals, from the horse and the zebra, the horse and the ass, the produce of the last two being the mule proper; from the lion and tiger, the dog and wolf, the dog and fox, the goat and ibex. Instances of hybrids between animals of different genera have been furnished by the union of the goat and the antelope, and of the stag and the cow. It used formerly to be considered that the propagative power of hybrids was either absolutely null, or that they propagated only with an individual of the pure breed; but the experiments of Mr. Darwin and other recent researches have shown that although infertility to some degree generally attends sexual intercourse between different species, yet in such intercourse every degree of difference from absolute sterility up to complete fertility is found. The results hitherto obtained may be summarized as follows:—The crossing of species of different families is in almost every case infertile; allied species are capable of producing offspring, and this capability is in indefinite ratio to the degree of their likeness; hybrids are frequently fertile with their parents, but more rarely among themselves; there is no fixed relation between the degree of fertility manifested by the parent species when crossed and that which is manifested by their hybrid progeny. In many cases two pure species can be crossed with unusual facility, while the resulting hybrids are remarkably sterile; and, on the other hand, there are species which can only be crossed with extreme difficulty, though the hybrids when produced are very fertile.

Hycsos, or HYKSHOS, or Shepherd Kings, wandering tribes of Semitic descent, who conquered the whole of Egypt about 2100 B.C., and were driven out some five hundred years afterwards. The only detailed account of them in any ancient writer is a passage of a lost work of Manetho, cited by Josephus. Their epoch covers the 13th to the 17th dynasties.

Hydaspes, ancient name of a river of India, the modern Jehlam or Jhilam.

Hyd'atid, a term applied to the larval stage of a small tape-worm, the *Tænia echinococcus*, found in the dog and wolf. The eggs set free from a dog may find entrance into the human body, in some part of which, especially the liver, the hydatid may develop into a sac of considerable size, causing serious illness.

Hyde, a town of England, in Cheshire, about 7 miles E.S.E. of Manchester. The inhabitants are largely employed in cotton manufacture and coal mines. There are also iron-foundries and engineering works. Pop. (1891), 31,682.

Hyde, or HIDE, a measure of land, frequently mentioned in Domesday-book and in old English charters, and variously estimated as equivalent to 60, 80, and 100 acres —a fact which may be accounted for on the supposition that the quantity was always determined by local usage. It was such a portion of land as might be ploughed with one plough. The hyde at present is reckoned at 100 acres.

Hyde, EDWARD, Earl of Clarendon. See *Clarendon*.

Hyde Park, a London park containing about 400 acres, and having on the west Kensington Gardens. It abounds with fine trees, and is the great fashionable promenade and public lounge of western London. It contains the Rotten Row, a piece of road set apart for equestrians; the Serpentine, a large sheet of ornamental water, much frequented in summer for bathing, and during frosts for skating; and the Albert Memorial, a structure in memory of the Prince Consort.

Hyderabad, or HAIDARABAD (hī-dar-ä-bäd'), a state of Hindustan, which comprehends the greater part of that central plateau of Southern India known as the Deccan, and is in possession of a Mohammedan prince, the Nizam; area, 80,000 sq. miles, exclusive of the Berar or Hyderabad Assigned Districts under British administration. The country is intersected or bounded by the Godavery, Kistnah, and their tributaries. The soil is fertile, though much good land is not yet brought under cultivation. The chief products are rice, wheat, maize, sugar-cane, tobacco, cotton, indigo, fruits, and timber. Pop. 11,357,040. The ruler of Hyderabad belongs to a dynasty founded by Asaf Jah, a distinguished soldier, whom the Emperor Aurungzeb made viceroy of the Deccan in 1713, with the title of Nizam or Regulator. Mir Mahbub Ali, the present Nizam, was born in 1866, and is in point of

rank the first Mohammedan ruler in India, with a regular army of about 15,000, besides numerous irregulars.—HYDERABAD, the capital, is situated on the river Musi, at an elevation of 1672 feet above the sea. It is surrounded by a stone wall flanked with bastions, forming an irregular quadrangle about 2¼ miles long upon the river and 2 miles broad. Amongst the chief buildings are the extensive palace of the Nizam, the British residency, the Char Minar, or Four Minarets, built about 1590 as a Mohammedan college, but now used for warehouses; the *Jama Masjid*, or cathedral mosque, designed after the one at Mecca. There are manufactures of silks, trinkets, and turbans. Pop. of city and suburbs, together with cantonments (1891), 415,039.

Hyderabad, or HAIDARABAD, a town of Hindustan, capital of Hyderabad District, Sind. It is situated on a rocky eminence about 3 miles from the eastern bank of the Indus. The streets are narrow and dirty, and the houses mere hovels. The fort contains the arsenal of the province of Sind and the palace of the Emirs. The principal manufactures are arms, silks, cottons, and lacquered ware. Pop. 58,048.—The district has an area of 9030 sq. miles; the pop. is 918,646.

Hyderabad Assigned Districts. See *Berar*.



Hyder Ali.

Hyder Ali, a distinguished Indian prince, born in 1728, son of a general in the service of the Rajah of Mysore. By his military talents he became the actual ruler of Mysore, and in 1762 deposed Kandih Rao, and had himself chosen Rajah. He encouraged agriculture and commerce, reorganized the army, and so greatly extended his dominions that in 1766 they contained 84,000 sq. miles, and afforded an immense revenue. In 1780 he formed an alliance with the Mahrattas against the English, took Arcot, but was defeated by Sir Eyre Coote, June 1, 1781. The Mahrattas now joining in a league against him, he carried on a disadvantageous war, during the continuance of which he died, in 1782. He was succeeded by his son, Tippoo Saib.

Hydra, in Greek mythology, a celebrated monster, which infested the neighbourhood of Lake Lerna in the Peloponnesus. Some accounts give it a hundred heads, others fifty, others nine. As soon as one of these heads was cut off two immediately grew up if the wound was not stopped by fire. It was one of the labours of Heracles to destroy this monster, and this he effected with the assistance of Iolaus, who applied a burning iron to the wounds as soon as one head was cut off. See *Heracles*.

Hydra, an island of Greece, on the east coast of the Morea; length, 12 miles; breadth, about 3. Its surface, though not very elevated (highest point 1939 feet), is almost entirely composed of bare sterile rocks; and the inhabitants, most of whom live in the town of Hydra, on the north-western shore, are engaged in trade and commerce. During the war of independence, the security which the island afforded raised its population for a time to 40,000; and the Hydriotes, with their fleet, played an important part in the struggle. Pop. of island, 7342; of the town, 6446.

Hydra (in zoology). See *Hydrozoa*.

Hydrangea (hī-dran'jē-a), a genus of shrubs or herbs of the nat. order Saxifragaceæ, containing about thirty-three species, natives of Asia and America. The garden hydrangea (*H. hortensis*) is a native of China, and was introduced into Britain by Sir J. Banks in 1790. It is a favourite for the beauty and size of its flowers.

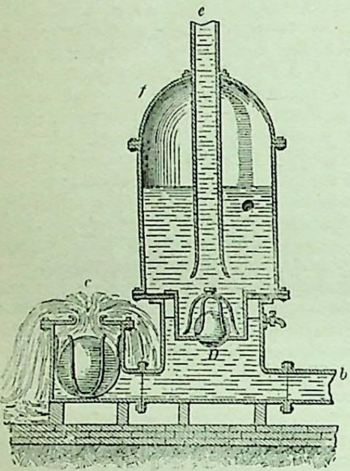
Hydraulic Crane, a crane wrought by the pressure of water applied on the principle of the hydraulic or hydrostatic press (which see). The mechanism consists of one or more such presses, with sheaves or pulleys and chains for the purpose of obtaining an extended motion in the chain from a comparatively short stroke of the

piston. The power is applied not only for lifting the load, but also for swinging the jib, which latter object is effected by means of a rack or chain operating on the base of the movable part of the crane, and connected either with a cylinder and piston having alternate motion, like that of a steam-engine, or with two presses applied to produce the same effect by alternate action.

Hydraulicon, an ancient musical instrument played by means of water; a water-organ.

Hydraulic Press, known also as *Hydrostatic Press* or *Bramah's Press*. See *Hydrostatic Press*.

Hydraul'ic Ram, a machine for raising water, and depending for its action on the impulse of flowing water. The water falling from a reservoir passes into a pipe or chamber (*b*), at the end of which there is a ball



Hydraulic Ram.

valve (*c*). The rush of supply water at first closes this, and the water finding no exit there acquires pressure enough to open another valve (*d*) and pass into an air-vessel placed over it (*f*). The cessation of pressure at valve *c* allows it to fall again; an outrush of water takes place there, relieving valve *d*, which again closes. The pressure of the flowing water upon valve *c* once more closes this valve, and valve *d* again opens, and an additional quantity of water is forced into the air-vessel; and so on by a series of pulsations which send the water along the service pipe, and, in properly arranged machines, raise it to a very considerable height, although the impulse is derived only from the fall of a few feet.

Hydraul'ics, that part of mechanical science which has to do with conducting, raising, and confining water, or of applying it as a motive power. It thus has to do with the flow of water in pipes or channels, and with the various machines in which water is utilized, such as water-wheels, pumps, turbines, the archimedean screw, the Barker's mill, the hydraulic ram, the hydraulic crane, the hydraulic or hydrostatic press, &c.

Hy'dride, in chem., a substance consisting of hydrogen combined with a metal, or some base which plays the part of a metal.

Hydrocarbons, in chem., a series of compounds which consist of carbon and hydrogen only. They are produced chiefly by the decomposition of organic substances, either slowly by natural causes, or by artificial means, as in the case of the destructive distillation of coal for the purpose of making gas. Certain of the hydrocarbons are also found in the gums which exude from trees. Among the best known are paraffin, benzine, turpentine.

Hydrocele (hī'dro-sēl), a collection of serous fluid in some of the coverings of the testicle or spermatic cord, or in the areolar texture of the scrotum. It is generally the result of a strain or an inflammation of the testes. A large tumour is formed, filled with fluid, which has often to be drawn off three or four times a year. A radical cure may be effected by setting up an inflammation which brings the opposite surfaces of the sac into adhesion, and thus obliterates the cavity.

Hydroceph'alus, an accumulation of fluid within the cavity of the cranium; dropsy of the brain. See *Dropsy*.

Hydrocharidaceæ, a nat. order of monocotyledonous floating and creeping plants, inhabiting ditches, rivers, and lakes in various parts of the world. The genus *Anacharis* belongs to it. See *Anacharis*.

Hydrochloric Acid, or MURIATIC ACID (H Cl), a gaseous compound of equal volumes of hydrogen and chlorine. It is evolved during volcanic eruptions, and is found in the water which collects in the crevices of mountains, as well as in rivers which take their rise in volcanic formations, especially in South America. It may be produced by decomposing common salt with sulphuric acid, or by bringing equal volumes of chlorine and hydrogen together and exposing the mixture to diffused daylight without

condensation. It explodes in direct sunlight. Hydrochloric acid is colourless, has a pungent odour, and an acid taste. It is quite irrespirable, extinguishes flame, and dissolves very readily in water. The chief use of hydrochloric acid in the arts is to supply chlorine to the bleaching-powder manufacturer. It is also used in the preparation of glue, phosphorus, carbonic acid, artificial waters, &c. In medicine it is used diluted as a tonic and astringent. In a concentrated form it is a powerful caustic.

Hydrochloric Ether. See *Chloric Ether.*

Hydrocyanic Acid. Same as *Prussic Acid* (which see).

Hydrodynam'ics, a branch of the general science of dynamics, treating specially of the laws of force as applied to fluids. It is divided into *hydrostatics*, which is concerned with forces applied to fluids at rest, and *hydrokinetics*, which treats of the application of forces so as to produce motion in fluids. The term hydrodynamics is, however, very often used in the latter sense, being thus opposed to hydrostatics. The name *Hydraulics* is given to the subject when considered with respect to its practical bearing on engineering science.

Hydro-electric Machine, a machine in which electricity is generated by the friction of steam against the sides of orifices through which it is allowed to escape under high pressure.

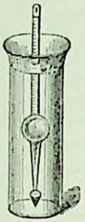
Hydrofluor'ic Acid (HF), or FLUOHYDRIC ACID, an acid which may be obtained either in the liquid form or in the anhydrous form, as a colourless gas. Both the dry and the liquid form act upon the skin with great virulence. Hydrofluoric acid is used chiefly for etching upon glass. The glass is covered with a thin coating of etching wax, and the design is traced through the wax down to the glass with a fine-pointed instrument. The plate is then treated either with an aqueous solution of the acid or is exposed to the gas itself. After a sufficient length of time the wax is dissolved away and the design becomes visible. In chemistry hydrofluoric acid is used to decompose and dissolve silicates in mineral analysis.

Hy'drogen, an important elementary substance, one of the elements of water and a component of all vegetable and animal products. It may be obtained by passing the vapour of water over red-hot iron filings, or by submitting water to the action of an electric current, whereby it is decomposed into its elements hydrogen and oxygen. Pure hydrogen is a colourless, tasteless, inodorous gas; it is very inflammable, burning with a pale, very slightly luminous, but intensely hot flame; it is a powerful refractor of light; the least dense and the most rapidly diffusible of all the gases and the lightest body in nature, being about $14\frac{1}{2}$ times lighter than atmospheric air, with a specific gravity of ·0693. In consequence of its extreme lightness it is the recognized standard of unity in referring to the atomic weight of bodies, and it has also been assumed as the unit in speaking of the specific gravity of gases, although common air is the more generally received standard. Hydrogen cannot support respiration, but is not directly poisonous, death ensuing from mere absence of oxygen. Two volumes of hydrogen with six of air form an explosive mixture. The most intense heat that can be produced is caused by the burning of hydrogen in oxygen gas, and this principle has been applied to increase the temperature of blast-furnaces in iron-works by making the gases pass separately through heated tubes to the furnace. Hydrogen is only slightly soluble in water, nor is there any other liquid which is capable of dissolving it in great quantity. Hydrogen gas can be liquefied by exposure to 650 atmospheres pressure and − 140° C., but remains liquid at 320 atmospheres pressure, the temperature remaining the same. It unites with all other elementary gaseous bodies, and forms with them compounds, not only of great curiosity, but of vast importance and utility: with nitrogen it forms ammonia; with chlorine, hydrochloric acid; with fluorine, hydrofluoric acid, &c.

Hydrog'raphy, that branch of geographical science which has for its object the description and natural phenomena of the water on the surface of the globe, whether in seas, lakes, or rivers. It may deal with the rivers, watersheds, lakes, &c., of a particular country; and it also embraces the determination of winds, currents, and other departments of marine-surveying. In Britain, France, the United States, &c., there are hydrographic departments kept up by government, which publish accurate charts of coasts, issue sailing directions, &c.

Hydrokinet'ics, that branch of hydrodynamics which treats of the application of forces producing motion in fluids, having thus to do with the flow of liquids in pipes, its issue from orifices under certain pressures, &c. See *Hydrodynamics.*

Hydrom'eter, an instrument primarily for determining the specific gravity of fluids, though some of them can also determine the specific gravity of solids. The hydrostatic principle on which the use of the hydrometer depends is the well-known one that when a solid body floats in a liquid, and thus displaces a quantity of the liquid, the weight of the solid body is equal to the weight of the liquid that it displaces. The density of the liquid is determined either by observing the depths to which the hydrometer sinks in the liquid (the hydrometer of variable immersion) or the weights required to make it sink to a given depth (the hydrometer of constant immersion). Of the second kind of hydrometer Nicholson's is a good example. It consists of a hollow cylinder of metal, surmounted with a very fine metallic stem, to the top of which there is attached a plate or pan for weights. From the bottom of the metallic cylinder hangs a kind of cup or basket. The whole instrument is weighted so as to float upright. On the fine metallic stem there is a marked point: and by putting weights on the upper pan the hydrometer is always made to sink precisely to this point. Thus the volume immersed is always the same. From what was said above, it is seen at once that different weights are required to sink it to the marked point in different liquids, the denser the liquid the greater being the weight required: and if the weight of the instrument itself is known, and also the *standard weight*, or weight required to sink it to the marked point in distilled water, the calculation of the specific gravity of any liquid from an observation with the instrument is very easy. But the specific gravity of solids can also be found by means of Nicholson's hydrometer, for which purpose the instrument is placed in distilled water and the solid body is put on the upper pan. Weights are then added till the hydrometer sinks to the marked point. But the *standard weight* of the instrument being known, it is plain that the difference between it and the weights that must be added on the upper pan to the weight of the body whose specific gravity is to be determined must be the weight in air of that body. The body is now transferred to the basket below the instrument, and the additional weights which must now be placed in the dish represent the weight of water displaced by the solid; and the weight of the solid itself divided by this weight is the specific gravity required. Hydrometers of variable immersion are usually made of glass. Each of them has a large hollow bulb, below which there is a smaller bulb weighted with mercury to make the instrument float upright. The stem is cylindrical and is graduated, the divisions being frequently marked on a piece of paper inclosed within the stem. The depth to which the hydrometer sinks in the liquid gives the density.


Hydrometer

Hydrop'athy, a method of treating diseases by the use of pure water both internally and externally, which has come extensively into practice. The system was originated by Vincent Priessnitz, a Silesian peasant, who in 1829 established at his native village of Gräfenberg an institution for the hydropathic treatment of diseases, and invented a variety of forms in which the water cure might be applied, such as the wet-sheet pack, the dry blanket or sweating pack, the sitz, douche, plunge, wave, &c., baths. The new system soon acquired popularity, and the original establishment expanded into an extensive suite of buildings. Other hydropathic institutions soon sprung up in other parts of Germany. In 1842 a hydropathic society was formed in London, and ere long numerous establishments were erected all over the United Kingdom. Before Priessnitz's death in 1851 he had the satisfaction of seeing his system adopted extensively throughout Europe, as well as in the United States of America, where it was introduced in 1843. In many cases there can be no doubt of patients having received great and lasting benefit by a sojourn at a hydropathic institution, and the free use of water in its various forms of appliance; but it may well be doubted whether these advantageous results are not as much to be attributed to the ablutions, exercise, and diet to which in such circumstances the patients readily conform themselves as to the wet bandages, douches, and other forms of hydropathic treatment.

Hydrophane, a variety of opal, made transparent by immersion in water. See *Opal*.

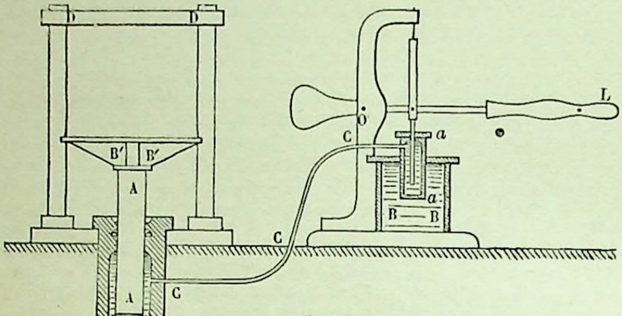
Hydropho'bia (Greek *hydōr*, water, and *phobos*, fear), a specific disease arising from the bite of a rabid animal. The animals most liable to be afflicted with madness are dogs; but cats, wolves, foxes, &c., are also subject to it. The early symptoms of rabies in the dog are such as restlessness and

general uneasiness, irritability, sullenness, an inclination for indigestible and unnatural food, and often a propensity to lap its own urine. As the disease proceeds the eyes become red, bright, and fierce, with some degree of strabismus or squinting; twitchings occur round the eye, and gradually spread over the whole face. After the second day the dog usually begins to lose perfect control over the voluntary muscles. He catches at his food, and either bolts it almost unchewed, or, in the attempt to chew it, suffers it to drop from his mouth. This want of power over the muscles of the jaw, tongue, and throat increases until the lower jaw becomes dependent, the tongue protrudes from the mouth, and is of a dark, and almost black colour. A peculiar kind of delirium also comes on, and the animal snaps at imaginary objects. His thirst is excessive, although there is occasionally a want of power to lap. His desire to do mischief depends much on his previous disposition and habits. He utters also a peculiar howl, and his bark is altogether dissimilar from his usual tone. In the latter stages of the disease a viscid saliva flows from his mouth, and his breathing is attended with a harsh, grating sound. The loss of power over the voluntary muscles extends, after the third day, throughout his whole frame, he staggers in his gait, and frequently falls. On the fourth or fifth day of the disease the dog dies, sometimes in convulsions, but more frequently without a struggle. In regard to man the rabid virus seems to be more violent when it proceeds from wolves than from dogs. It appears to be contained solely in the saliva of the animal, and does not produce any effect on the healthy skin. But if the skin is deprived of the epidermis, or if the virus is applied to a wound, the inoculation will take effect. The development of the rabid symptoms is rarely immediate; it seldom takes place before the fortieth or after the sixtieth day, but in some cases has occurred after six months or even longer. It begins with a slight pain in the scar of the bite, sometimes attended with a chill; the pain extends and reaches the base of the breast, if the bite was on the lower limbs, or the throat, if on the upper extremities. The patient becomes dejected, morose, and taciturn. He prefers solitude, and avoids bright light; frightful dreams disturb his sleep; the eyes become brilliant; pains in the neck and throat ensue. These symptoms precede the rabid symptoms two or three days. They are followed by a general shuddering at the approach of any liquid or smooth body, attended with a sensation of oppression, deep sighs and convulsive starts, in which the muscular strength is much increased. A foamy, viscid slaver is discharged from the mouth; the deglutition of solid matters is difficult; the respiration hard; the skin warm, burning, and afterwards covered with sweat; the pulse strong; the fit is often followed by a syncope; the fits return at first every few hours, then at shorter intervals, and death takes place generally on the second or third day. No means have yet been found of arresting the progress of the poisonous virus after it has once developed in the system. The treatment, therefore, consists in preventing its development, which may be effected by applying a ligature, where possible, to impede the circulation from the wound, by sucking it, and thoroughly cauterizing it either with nitrate of silver or with iron heated to a white heat, the pain of cautery being less as the temperature is greater. If these means are not available, any burning substance and most acids may be used. Within a quite recent period M. Pasteur put forward a method of preventing the development of the disease by a system of successive inoculations with rabid virus of greater and greater intensity; the inoculation being made the first day with marrow which has been extracted from the rabid animal 12, 10, and 8 days; then the second day with marrow extracted 6, 4, and 2 days; the third day with one day's marrow, &c. M. Pasteur's method has been favourably reported on by an English commission (1886–7), but there is perhaps some room for doubts regarding the number of cures really performed. As a sharp critic of the Pasteur system has remarked, every one who is bitten and inoculated is counted in the list of cures, though there is nothing to prove that he ever contracted the rabies.

Hydroph'ora, one of the three divisions into which Huxley and other authors divide the Hydrozoa, the other two being the Discophora and the Siphonophora.

Hydrostat'ic Press, or BRAMAH'S PRESS, a hydrostatic apparatus which in its practical application was invented by Bramah in 1796. It will be understood from the accompanying figure. By means of a suction and force pump *a a*, worked by the lever or handle L turning about the point O,

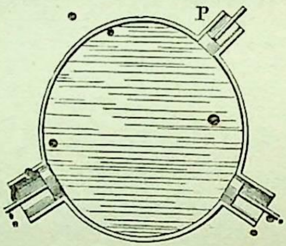
water is drawn from the reservoir B B and forced along the tube C C into the cistern V through the top of which a heavy metal plunger A A works. On the upper end of



Section of Hydrostatic Press.

the plunger is a large plate B′ B′ upon which the goods to be pressed are placed. When water is pumped from the reservoir B B into the cistern V, the pressure exerted by the plunger of the pump is transmitted according to the well-known hydrostatic principle (see *Hydrostatics*) to the bottom of the plunger A, which accordingly rises and carries the objects placed on plate B′ B′ up against the top of a fixed frame D D. It was the invention by Bramah of a water-tight leather collar surrounding the piston that made the use of the press practicable; before his invention not much power could be developed from the escape of the water round the piston. The collar consists of a leather ring bent so as to have a semicircular section (as seen in cut), so that the water passing between the piston and cylinder fills the concavity of the collar, and by pressure produces a packing which fits the tighter as the pressure on the piston increases. The hydrostatic press may be constructed to give pressures of two or three hundred tons, and is extensively employed where very great force is required, as in testing anchors or raising very heavy weights.

Hydrostat′ics is that part of the general science of hydrodynamics that treats of the application of forces to fluids at rest. Among the chief principles of hydrostatics may be mentioned the following: (1) The intensity of pressure at any point of a fluid is the same in all directions; it is the same whether the surface that receives the pressure faces upwards, downwards, horizontally or obliquely. (2) When a fluid is confined, if the intensity of pressure in one part be increased, as by forcing in a piston or by any other means, an equal increase will be produced in the intensity of pressure at all other parts: in other words, pressure applied to any one part is transmitted without any change in its intensity to all other parts. The diagram will aid in the understanding of this. If pressure is applied to P it will be transmitted in all directions through the liquid. If other openings are made, and if they are fitted with pistons, the pressure that must be applied to any piston equal in area to the area of P is equal to the pressure on P; and if the area of one of the other pistons is greater or less than the area of P, the pressure required to keep it in its place is proportionately greater than or less than the pressure that is applied to P. This principle, which is known as Pascal's principle from being distinctly formulated by



Pascal's Principle.

him, is the most important in hydrostatics, and finds a practical application in the Hydrostatic, or Bramah's Press (see above). (3) Not only is pressure transmitted out to the surface or envelope of the liquid, but within the fluid itself the particles are all pressed together. When a solid is immersed in the liquid it is pressed at every point of its surface in the direction perpendicular to the

surface at that point. (4) In every horizontal layer throughout the liquid the pressure per unit area is the same; and this is the case independently of the shape of any vessel in which the liquid may be contained. The pressure per unit area in any horizontal layer depends only on the height of the free surface of the liquid above the layer considered, and the specific gravity of the liquid: and it is equal to the weight of a column of the liquid of unit sectional area whose height is the height of the free surface. Hence whatever be the shape or size of several vessels, if all have the same area of base, and if in all the water stands at the same height, the pressure on each of the bases is the same. (5) When a solid is immersed either partially or wholly in a liquid a portion of the liquid is displaced. The solid is at the same time pressed at every point by the liquid. But the upward pressure on the solid is greater than the downward by an amount equivalent to the weight of the liquid displaced by the solid. Hence we obtain what is called the principle of Archimedes, namely, that a body immersed either wholly or partially in a fluid loses a portion of its weight equal to that of the fluid which it displaces. This principle is of great importance as regards the floatation of bodies, and the determination of specific gravity, &c. In regard to the sinking or floating of bodies three different cases may thus arise: First, the weight of the body may exceed the weight of the liquid it displaces, in which case the body sinks in the liquid; Second, the weight of the body may be less than that of the liquid displaced, in which case the body will not remain submerged unless forcibly held down, but will rise to the top and partly out of the liquid until the weight of the liquid displaced is equal to its own weight; Third, the weight of the body may be equal to the weight of the liquid displaced, in which case it will have little or no tendency either to sink or rise.

Hydrosulphu'ric Acid, or sulphuretted hydrogen or hydrothionic acid (H_2S) is a colourless inflammable gas produced by the putrefaction of sulphurous organic matters. Many mineral waters contain it naturally. It may be artificially produced by burning sulphur vapour in hydrogen, or by passing hydrogen through sulphur. It has a sweet taste but a very nauseous odour as of rotten eggs. It has poisonous effects when breathed, and experiments have shown that birds perished in air which contained $\frac{1}{1500}$th part of the gas.

Hydrothor'ax, a dropsical condition of the pleura, in which the pleural cavity contains a serous fluid exuded from the blood-vessels, not due to inflammation. It may be the result of organic disease in the heart or kidneys, or of pressure on vessels obstructing the return of blood.

Hydrozo'a, a class of animals of the sub-kingdom Cœlenterata, in which the walls of the body inclose a simple undivided cavity which acts both as a body cavity and a digestive cavity. The body is essentially composed of two layers, an outer layer or ectoderm and an inner or entoderm. Reproductive organs are developed as external processes of the body-wall, but reproduction also takes place by fission. The Hydrozoa are all aquatic and almost all marine. The fresh-water hydra is a very good type of the class. The body is quite soft, and when fully contracted appears like a particle of matter resting on the surface of a plant or stone; but when expanded it shows a long slender body of a bright green or light-brown colour. One end of the body develops into a number of long slender tentacles, within which, near their bases, the mouth of the animal is found. This is the *distal* or free-growing end. The other and more slowly growing end is known as the *proximal*, and ends in a kind of disc or foot by which the hydra attaches itself to objects. The body is hollow from one end to the other. It is found most in semi-stagnant waters, where, hanging from its foot-disc, with its long tentacles expanded, it seizes on the small crustaceans or other suitable prey which comes in contact with it. Its tentacles have a stinging power which soon paralyses its prey. Under favourable conditions one or more hydræ are usually found attached to the parent form. Such are produced by a process of budding from the parent. Each of these ultimately separates from the parent stem and becomes an independent hydra. The Hydrozoa are divided by Prof. Nicholson into six sub-classes, viz. the Hydroida, the Siphonophora, the Lucernarida, the Graptolitoidea, the Hydrocorallinæ, and the Stromatoporoidea.

Hye'na, a genus of digitigrade carnivorous quadrupeds, constituting a family which unites the skull characters of the Felidæ (cats) with the skeleton and gregarious habits of the Canidæ (dogs). The characters of this genus are five molars above, and five or four

below, on each side, the three anterior molars being conical, smooth, and remarkably large, adapted for breaking the bones of their prey; the tongue is rough; the legs



Striped Hyena (*Hyæna striāta*).

are each terminated by four claws; the fore-legs are longer than the hind legs; the eyes large and prominent; the ears long and acute; the jaws are remarkable for the strength of their muscles, and can crush the hardest and most massive bones with ease. The genus is confined to Africa and Asia. There are three species known—the striped hyena (*Hyæna striāta*), the spotted (*H. crocūta*), and the brown hyena (*H. brunnea*). They are nocturnal animals, extremely voracious, feeding chiefly on carrion, and thus being of great utility in the countries where they live; to obtain dead bodies they will even dig up graves. Along with the true hyenas, the aardwolf of South Africa is also included in the family of Hyænidæ. An extinct species, the *cave hyena* (*H. spelæa*), was abundant in England, France, and Germany anterior to the glacial epoch, and has left its remains in many caves of these countries.

Hyères (ē-ār), a town of Southern France, dep. Var, 10 miles east of Toulon, beautifully situated on a declivity facing the Mediterranean. It is much frequented by patients suffering from chest or nervous disorders. Pop. 7730.



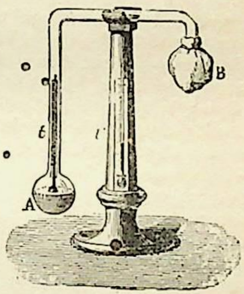
Hygieia, from antique statue.

Hyères Islands, a group of islands in the Mediterranean, on the coast of France a little south of the town of Hyères. Pop. 600.

Hygieia (hī-ji-ē'ya), the Greek goddess of health, daughter of Asclepius, or Æsculapius. Her temple was placed near that of Æsculapius, and her statues were even erected in it. She is represented as a blooming maid with a bowl in her hand, from which she is feeding a snake, the symbol of health.

Hygiene (hī'ji-ēn), the department of medicine which treats of the preservation of health, and the duration of life prolonged by a due attention to physiological or natural laws. It is usually divided into public and private hygiene, the former having to do with measures for excluding causes of disease (see *Quarantine* and *Vaccination*), methods of securing cleanliness in the streets and dwellings (see *Sanitary Science* and *Sewage*), methods of maintaining the purity of the supply of food and drink (see *Adulteration*); the latter may be considered to embrace such subjects as alimentation (see *Aliment*, *Digestion*, and *Dietetics*), clothing (see *Clothing*), exercise and muscular development (see *Gymnastics*), &c.

Hygrom'eter, an instrument for measuring the degree of moisture of the atmosphere. The chief classes of hygrometers depend either upon absorption or upon condensation. Of the former kind is the hygrometer of Saussure, in which a hair, that expands and contracts in length according as the air is more or less moist, is made to move an index. Of the latter sort is Daniell's hygrometer. This instrument consists of a bent glass tube, terminating in two bulbs, the bulb A being two-thirds filled with sulphuric ether, and the bulb B being, at the commencement of an experiment, empty. The latter is covered with muslin. In process of construction the tube is exhausted of air, and is thus filled with vapour of ether through its entire length. A thermometer (t) whose bulb is immersed in the ether of the lower arm, is inserted in the tube to register variation of temperature, and a second thermometer (t') is attached to the stand of the instrument, to show the temperature of the outer air. If sulphuric ether be dropped on the bulb B, as it evaporates the bulb is cooled, and the vapour of ether is condensed within



Daniell's Hygrometer.